EXPORT NUMBER

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CANADIAN MACHINERY AND MANUFACTURING NEWS

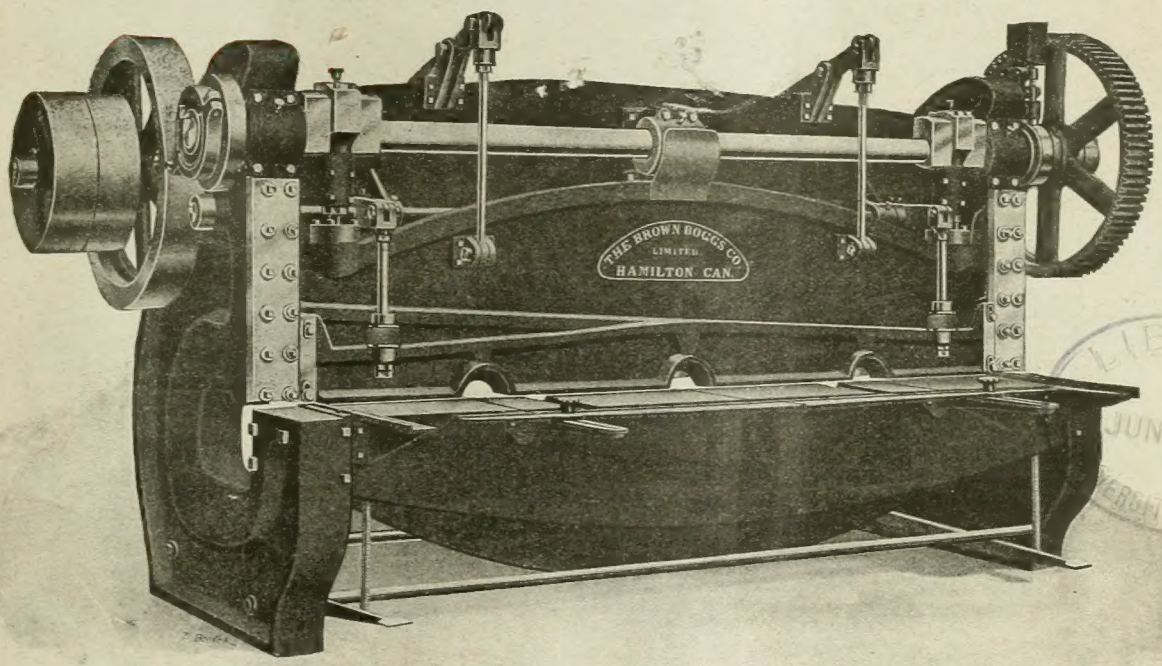
A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada.

Vol. XXI. No. 6. Publication Office: Toronto, February 6, 1919 Subscription Price $3.00 per Year

B B Co Ltd.

SHEARS OF SERVICE

B B Co Ltd



No. 7127---Shear 10' 6" long for 1-4" Sheets

Built in all lengths and to cut sheets up to three-eighth inch in thickness. Are constructed of the finest materials throughout. The castings are massive and well proportioned.

Manufacturers of High Grade Sheet Metal-working Machinery of every description, including Power Presses, Drop Hammers, Bending Rolls, Shears of all kinds, Double Seamers, etc. Also a full line of Tinsmiths' Tools and Machines.

B B Co Ltd.

The Brown, Boggs Co., Limited
Hamilton, Canada

B B Co Ltd.

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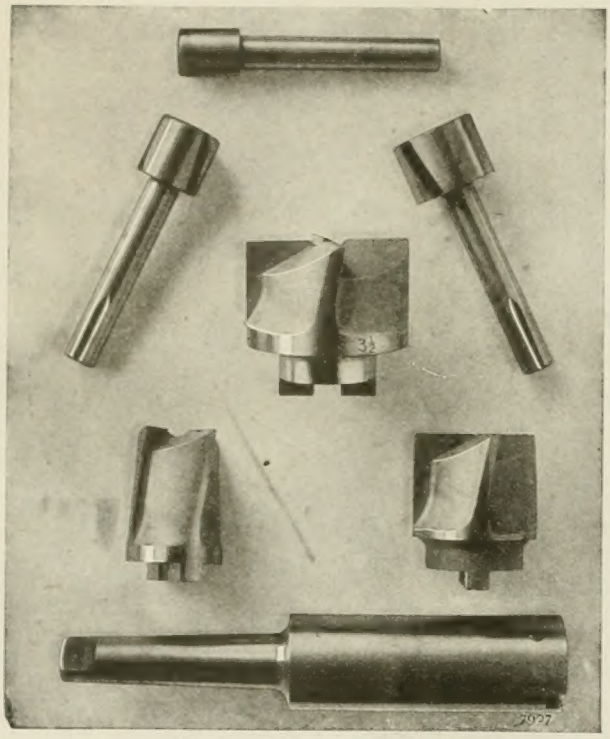
SMALL TOOLS

Equip Your Tool Room With

PRATT & WHITNEY

Interchangeable Cutter Counterbores



and get the right combination at once.

HOLDER, CUTTER and GUIDE

With this combination you can immediately make the right combination for every counterboring job.

HOLDERS

End of holder is milled to receive the driving lug of the cutter, and there is also a hole and set screw to accommodate the shank of the guides.

GUIDES

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

CUTTERS

Can be furnished of either carbon or high-speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face, and the guide is simply pushed further in the hole after grinding.

Holders, Cutters and Guides are furnished in a wide range of sizes.

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

OF CANADA, LIMITED

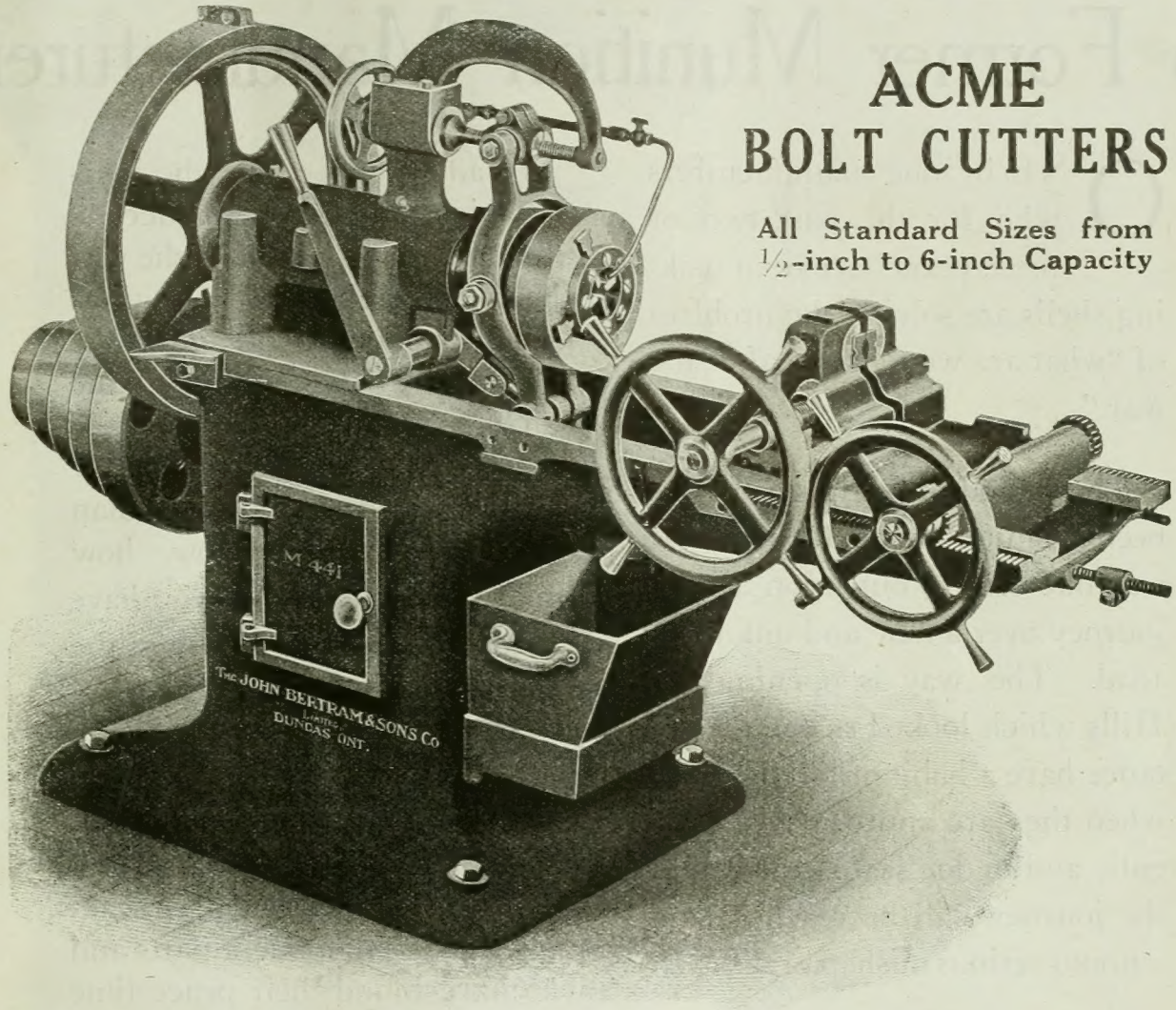
Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

ACME BOLT CUTTERS

All Standard Sizes from ½-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE OR MACHINES IN WHICH YOU ARE INTERESTED.

The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

MONTREAL	TORONTO	VANCOUVER	WINNIPEG
723 Drummond Bldg.	1002 C.P.R. Bldg	609 Bank of Ottawa Bldg.	205 McArthur Bldg.

If any advertisement interests you, tear it out now and place with letters to be answered.

The Publisher's Page

TORONTO FEBRUARY 6, 1919

To Former Munition Manufacturers

ONE by one manufacturers who for the past two or three years have been making shells are solving the problem of "what are we to make after the war."

The period of readjustment has been definitely entered upon. It was like setting out upon a long journey over a new and unknown road. The way is opening up. Hills which looked steep at a distance have a habit of levelling out when they are approached. Presently and in due season the end of the journey will be reached, and without serious mishap or disaster.

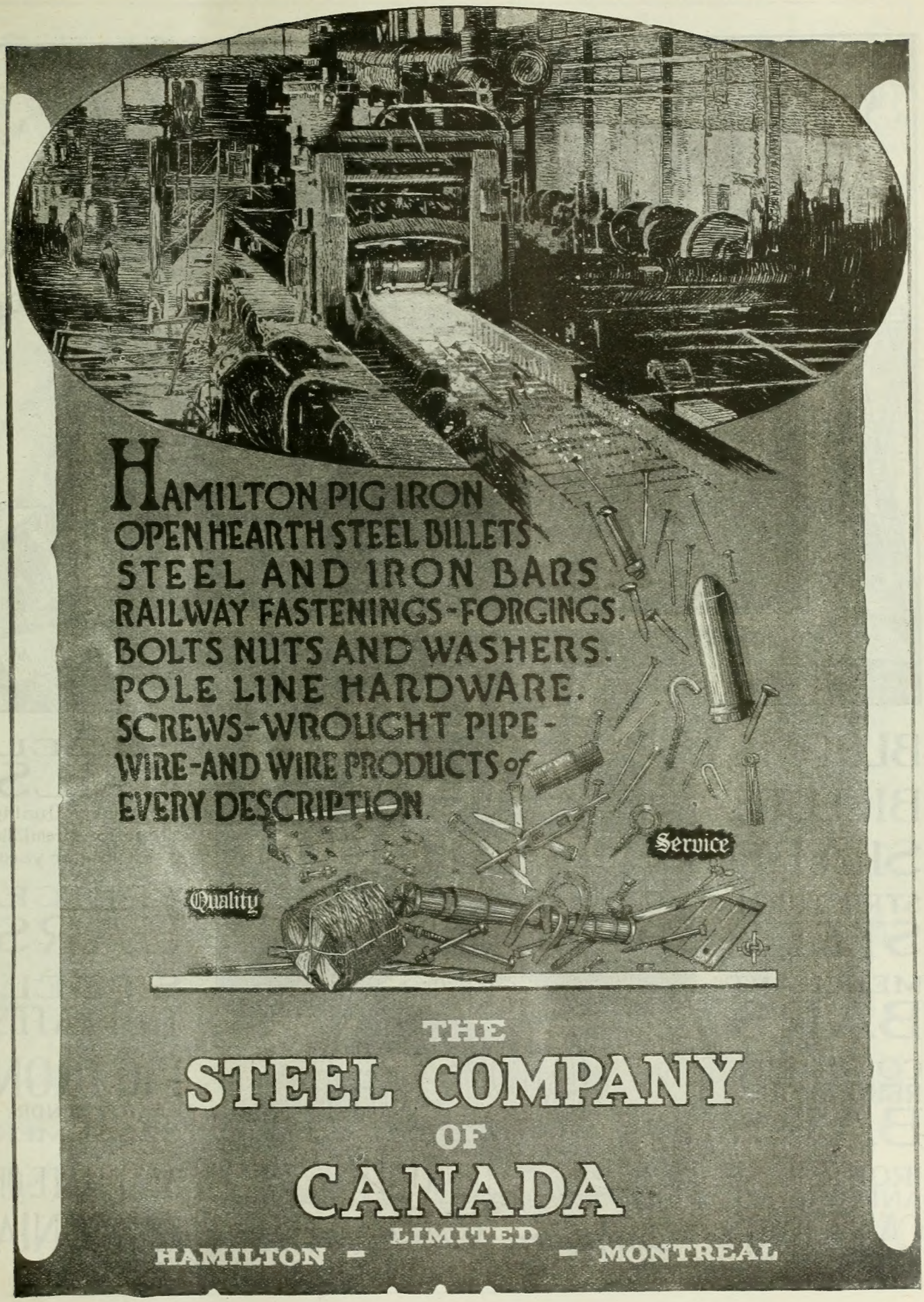
There is lots of advice we could offer at the present time, but advice is a drug on the market. Firms and individuals will go their own ways and will work out their own salvation. There is one piece of advice we can give, however, and we know it to be sound.

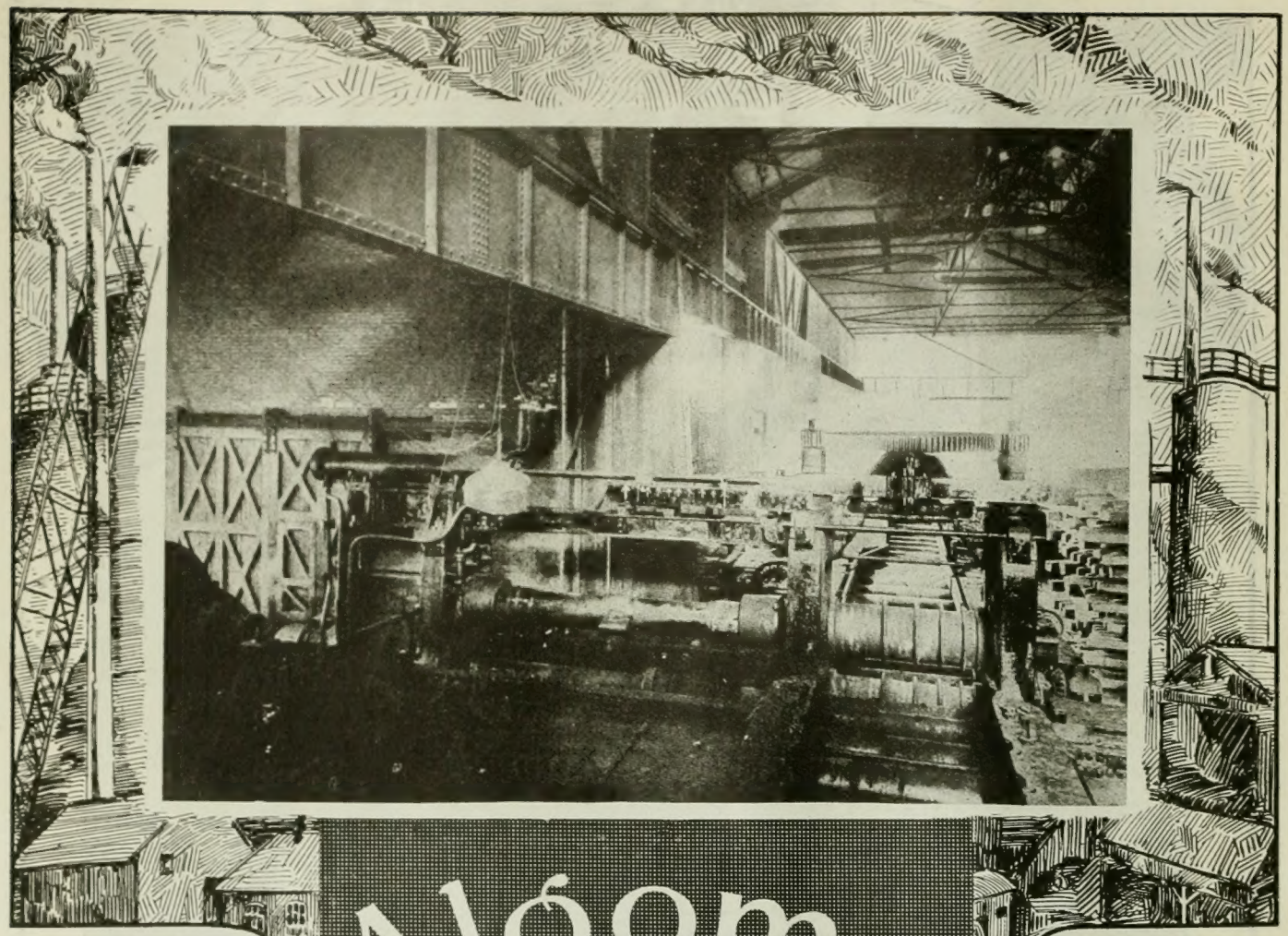
It is this:

We advise you to use the journal which served you so successfully during the period of the war when you were making munitions if you are about to engage in the manufacture of some new line which is to be marketed in the metal working field. If you have been an advertiser in Canadian Machinery, you'll know how sound this advice is. If you have not advertised and wish to test the soundness of our advice ask any regular advertiser.

We have lately received contracts for advertising from several manufacturers who had been making shells or component parts and who have found their peace time level.

Canadian Machinery was never stronger or better able to serve than it is to-day. It covers the iron and steel, machinery, railway shop and general metal working fields. If you wish to reach these fields then we should get together promptly.


HAMILTON PIG IRON
OPEN HEARTH STEEL BILLETS
STEEL AND IRON BARS
RAILWAY FASTENINGS-FORGINGS.
BOLTS NUTS AND WASHERS.
POLE LINE HARDWARE.
SCREWS-WROUGHT PIPE-
WIRE-AND WIRE PRODUCTS of
EVERY DESCRIPTION
Service
Quality
THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON - - MONTREAL



Algoma Steel Corporation Limited
Sault Ste Marie, Ont

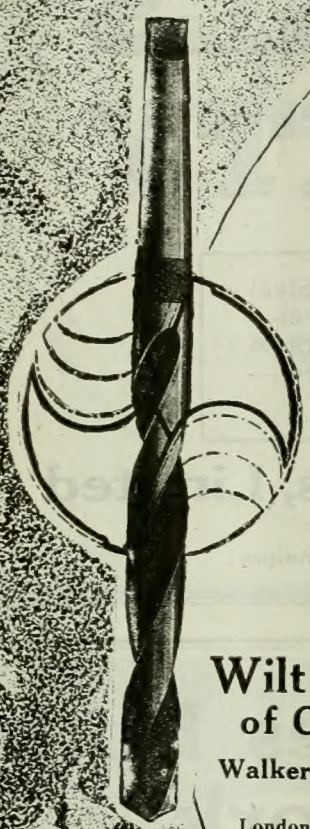
BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL
MERCHANT BARS
CONCRETE REINFORCING BARS
IRON, BRASS AND BRONZE CASTINGS

MARK OF ALGOMA O.H. QUALITY

Sulphuric Acid. Nitre Cake

STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)
SPLICE BARS
STEEL TIE PLATES
PIG IRON
BASIC, FOUNDRY-BESSEMER
SULPHATE OF AMMONIA

WILT HIGH SPEED AND CARBON TWIST DRILLS



Are You Getting Drill Efficiency?

WILT HIGH SPEED and CARBON TWIST DRILLS are the kind of tools you can depend upon to give the highest form of drill service. If you are not getting the drill efficiency you would like, adopt WILT DRILLS. They have the quality that gives long service and assures true, quick-drilled holes. **Give them a trial.**

Wilt Twist Drill Co.
of Canada, Limited
Walkerville - Ontario

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England

Where there's a WILT— There's the Way

If any advertisement interests you, tear it out now and place with letters to be answered.

Trade-Mark Registered U.S. Patent Office

L-XX HIGH SPEED
AND OTHER Atlas
TOOL STEELS of QUALITY

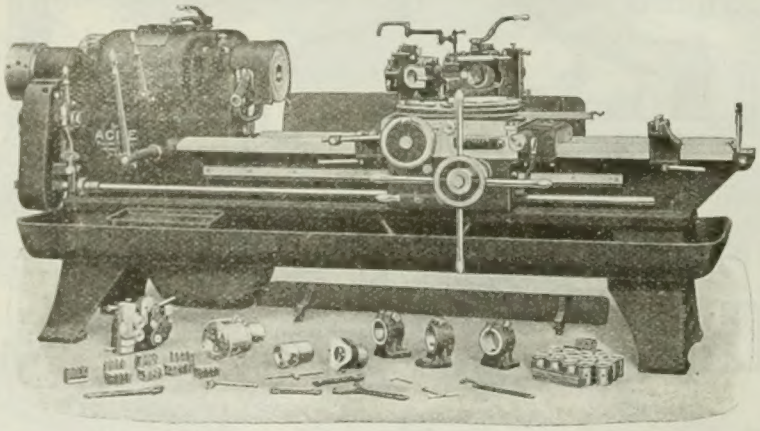
GRADES: L-XX High Speed Steel—Atlas Hot Die Steel —Atlas Special Alloy—Atlas Triple Extra Tool Steel— Atlas Double Extra Tool Steel—Atlas Refined Tool Steel —Deward Oil Hardening Non-Shrinking Tool Steel— E. B. Alloy—A C S C O Special Steels.

Standard Machinery & Supplies, Limited
261 NOTRE DAME, ST. W., MONTREAL
Western Representative: WM. W. HICKS, 557 Banning St., Winnipeg

Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



3¼ in. x 36 in. Flat Turret Lathe Equipped for Bar Work.

Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vees, upon which the turret carriage travels.

We also make a full line of Screw Machines and Turret Lathes.

Write for Valuable Bulletin.

The Acme Machine Tool Co.
Cincinnati, Ohio
Canadian Agents: Rudel-Belnap Machinery Co., of Montreal and Toronto

LOCOMOTIVE CASTINGS

CANADIAN STEEL FOUNDRIES, LIMITED
Transportation Building
MONTREAL

Swedish Steel & Importing Co., Limited

Montreal
New York
Toronto
Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS "DOUBLE ESS"

PROMPT SHIPMENTS from large stock

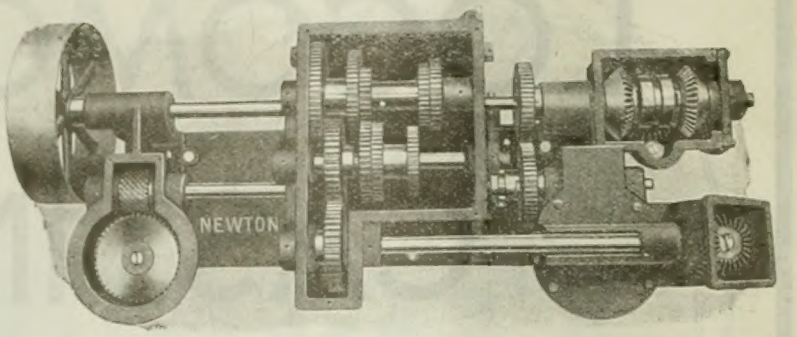
Forging Billets and Bars
Electric Furnace
Alloy Steels
Die Blocks
Annealed
Piston Rods Rough Turned
Annealed
Blue Ribbon
High Speed Steel

General Steel Company
Milwaukee, Wisconsin
DETROIT—823 Dime Bank Building

THE JOHNSON FRICTION CLUTCH

OVER THERE

is incorporated in a nest of gears and controls the rail elevating on a NEWTON Four Spindle Milling Machine.

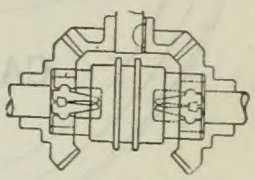


Courtesy of Newton Machine Tool Works, Phila., Pa.

YOU SHOULD

incorporate clutches in your machine. Bear in mind that there is a JOHNSON FRICTION CLUTCH for every requirement. Follow our ads., note the machine tool builders who have adopted JOHNSON FRICTION CLUTCHES. Send us a blue print showing where you desire to use a clutch. We will then show you just what we would supply. This is a part of JOHNSON SERVICE. What are your requirements?

Our booklet, "Clutches as Applied in Machine Building," and Yellow Data Sheets are free.



Double Clutch in Nest of Gears

AGENTS: CANADA—Williams & Wilson, 320 St. James St., Montreal; The Canadian Fairbanks-Morse Co., Limited, Montreal and Branches. ENGLAND—The Efandem Co., Limited, 22 Newman St., Oxford St., London, W.I., Sole Agents for British Isles. AUSTRALIA—Edwin Wood Pty., Hdwe. Chambers 231 Elizabeth St., Melbourne, Victoria. JAPAN—Andrews & George Co., 16 Takegawacho, Kiobashiku, Tokyo. SOUTH AFRICA—D. Drury & Co., Main Street, Johannesburg. FRANCE—Anciens Etab. Glaenzer & Perreaud, 18 Fauborg du Temple, Paris.

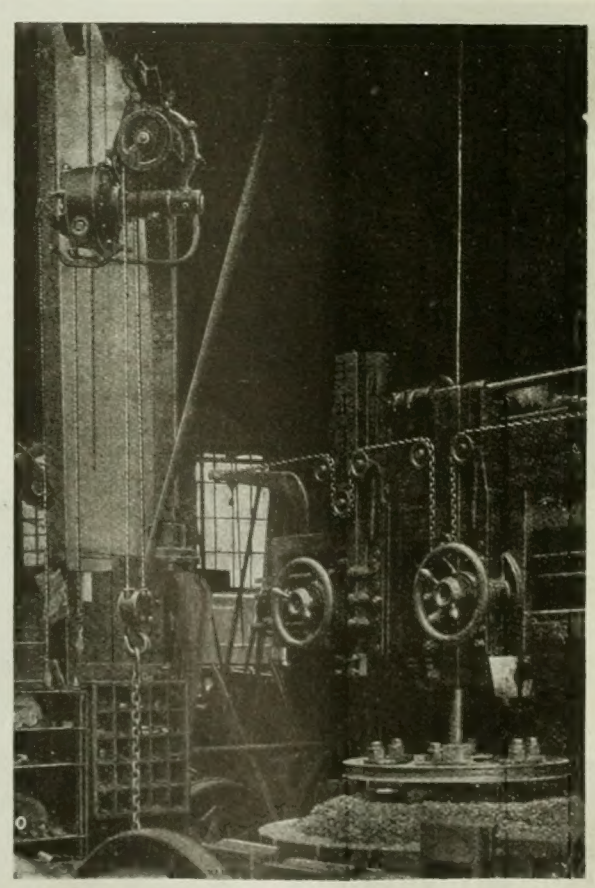
THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Why Waste Valuable Time Lifting by Hand?

Wher ver you see a heavy machine tool without a ho st to help the machinist you see good money going to waste. All handling time is "non-productive," the less of it you have the better.

REDUCE YOUR HANDLING TIME BY USING THE "IMPERIAL HOIST"

For this class of work the "Imperial" Hoist is well fitted. Its construction is simple, it is dust-proof, its air-consumption is very low and does not compare with the saving in labor.



Canadian Ingersoll-Rand Co.,

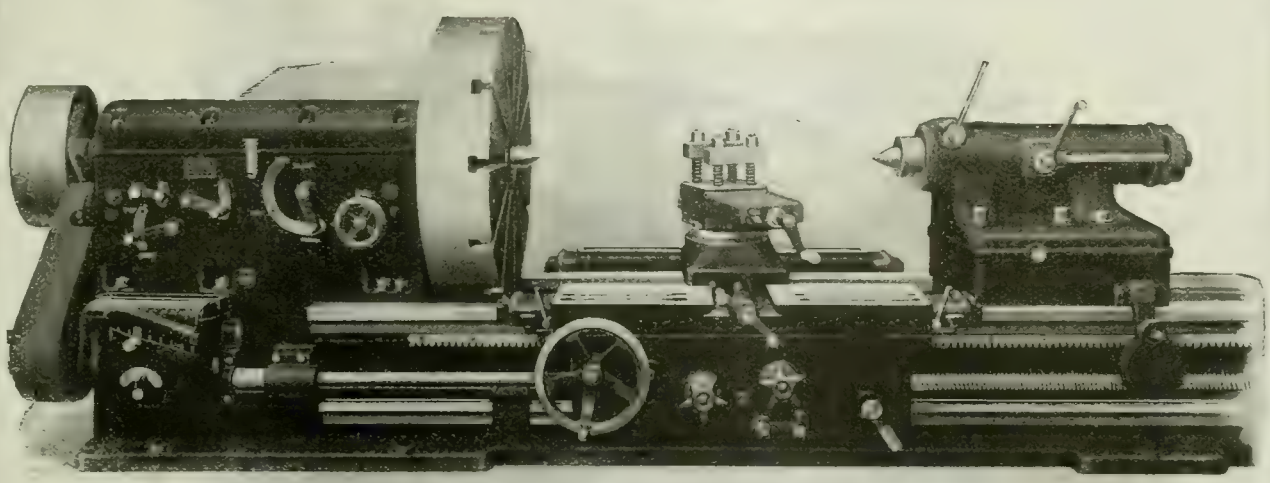
Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

BRIDGEFORD

Heavy Duty Lathes



"I'm from Missouri," said the Superintendent of a large manufacturing plant who was in the market for several lathes. "All these catalogues look pretty and sound good but—*I want to be shown.*"

After much persuasion he finally agreed to install a Bridgeford Lathe as a "try-out."

The "Bridgeford try-out" was subjected to the severest tests, but its production, accuracy, power and all-round faithful performance converted the skeptical Superintendent, and several additional Bridgefords were soon installed.

Bridgeford Heavy Duty Lathes range in size from 24" to 72" swing and include Engine Lathes, Axle Lathes, Journal Truing Lathes, Plain Turning Lathes, Screw Cutting Lathes, Shaft Lathes, Turret Lathes, and Bevel Gear Turning Machines.

There's a "Bridgeford" for every heavy duty lathe requirement. Write or wire for details. We are in position to make prompt deliveries.

BRIDGEFORD MACHINE TOOL WORKS

161 Winton Road, Rochester, N. Y.

Manufacturers of Heavy Duty Lathes for more than 20 years

FORD-SMITH

Milling Machines

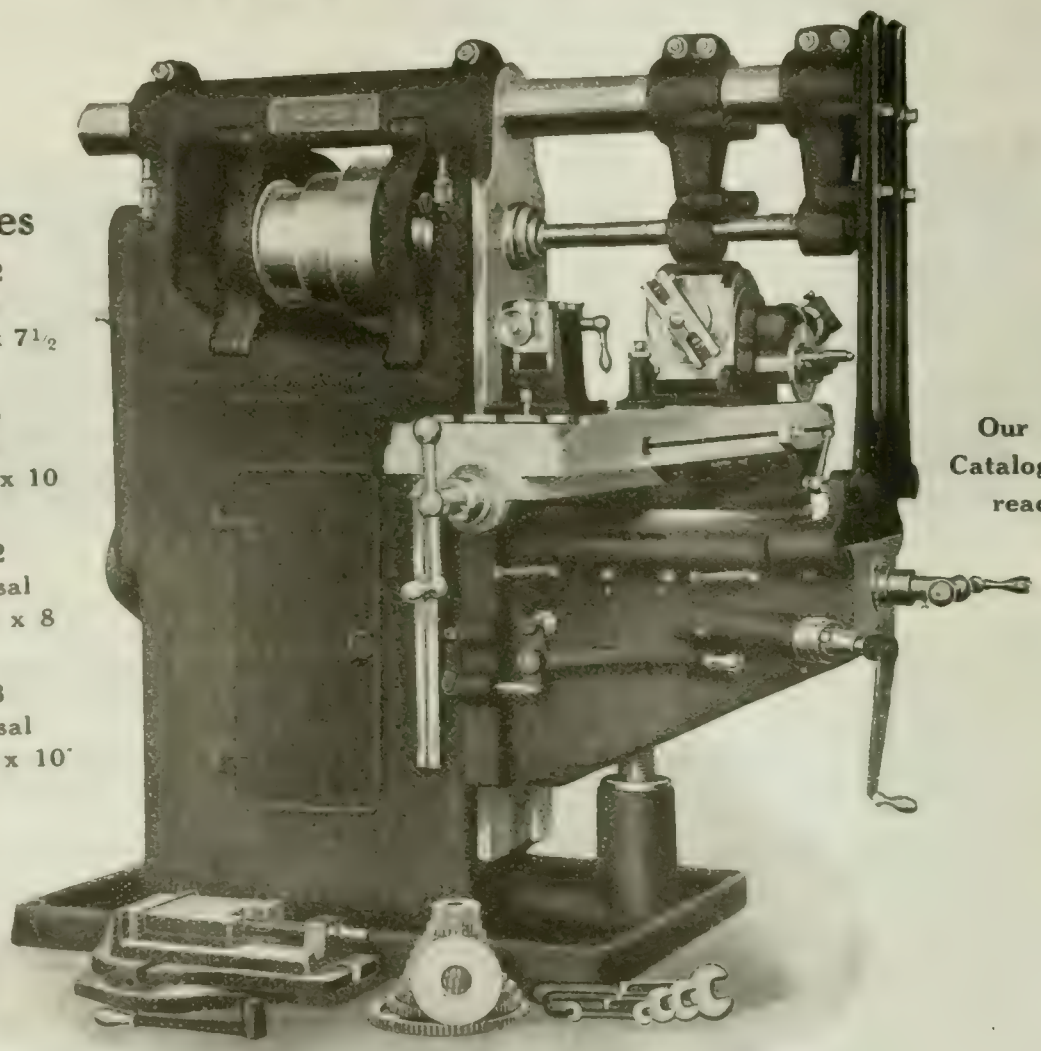
4 Sizes

No. 2
Plain
24 x 19 x 7½

No. 3
Plain
34 x 20 x 10

No. 2
Universal
25 x 17 x 8

No. 3
Universal
30 x 19 x 10



Our new Catalogue is ready.

Ford-Smith No. 3 Universal

These machines are accurate, strong and rigid, with well-balanced design to handle rapid and accurate production.

MANUFACTURED IN CANADA BY

The Ford-Smith Machine Co., Limited

Hamilton, Ontario, Canada

Foreign Agents: W. E. Storey, 3 Arundel St., London England;
Alf. Herbert, Limited, 3 Dey St., New York, U.S.A.

WOLFRAM
HIGH SPEED STEEL

VULCAN
TOOL STEELS
for Every Purpose

Vulcan Special Vanadium—For Punches and Dies. Has wonderful wearing qualities.

Vulcan Non-Shrinkable—For Intricate Dies. Does not warp. Does not shrink.

Vulcan Regal No. 2—For Fine Finishing Tools. The Highest grade tungsten finishing steel.

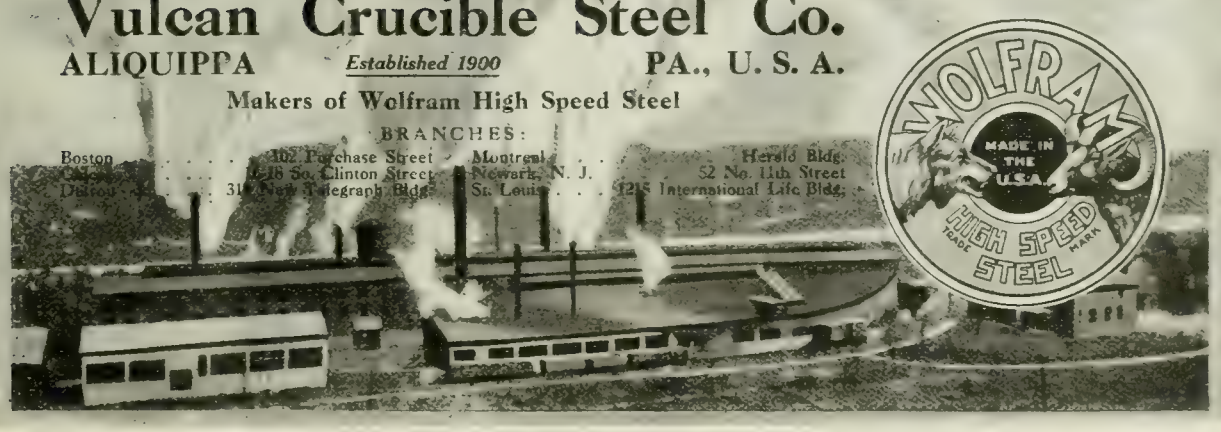
Vulcan Hecla—For work requiring great strength. The first high grade Chrome Vanadium steel produced in America.

WRITE FOR CATALOGUE

Vulcan Crucible Steel Co.
ALIQUIPPA *Established 1900* PA., U. S. A.
Makers of Wolfram High Speed Steel

BRANCHES:

Boston	102 Purchase Street	Montreal	Herald Bldg.
Chicago	618 So. Clinton Street	Newark, N. J.	52 No. 11th Street
Detroit	31[illegible] New Telegraph Bldg.	St. Louis	1218 International Life Bldg.



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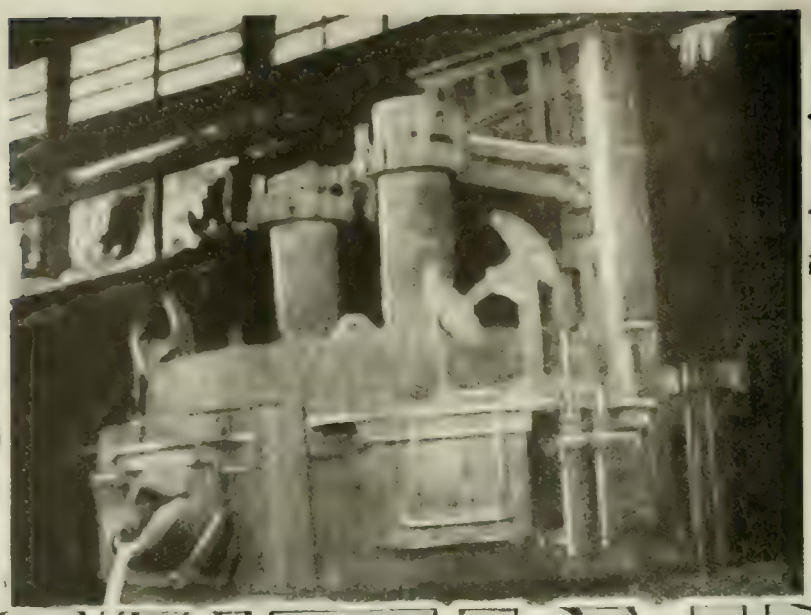


ELECTRITE

High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art: Electric Furnaces—entirely infallible, automatically regulated, delivering the same result time after time.

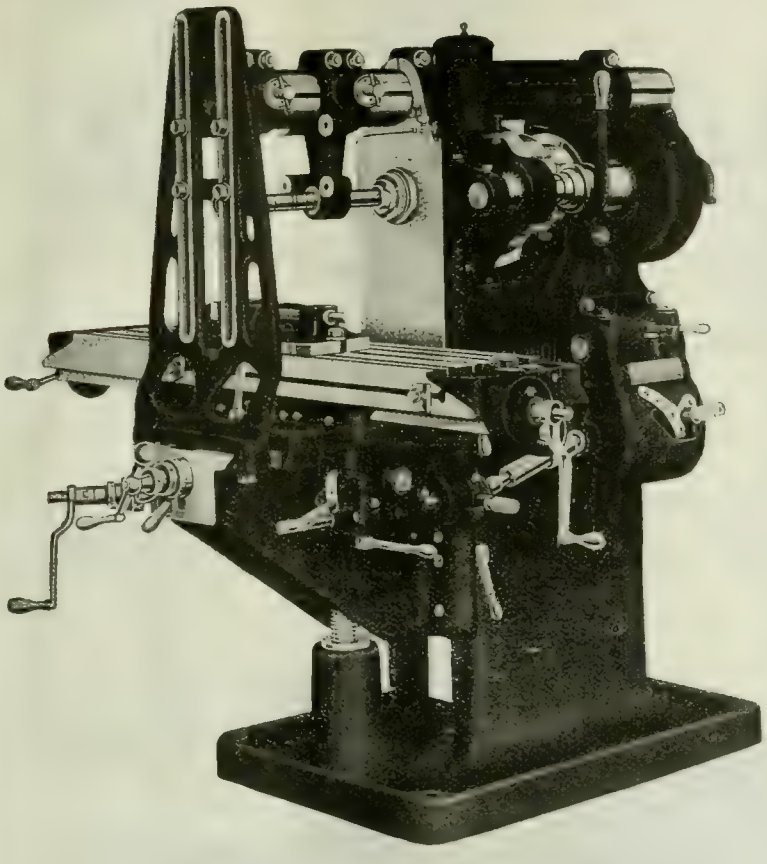
Uranium—this rare element, cousin to Radium, effects a profund change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.

LATROBE, PENN.

URANIUM



LeBLOND

Heavy Duty Milling Machines

Plain or Universal Types—Cone or Gear Drive. All commercial sizes No. 0 to No. 5.

Adapted for the Heaviest Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

Patent Self-Aligning Arbor Supports—

Hardened Steel Spindle Bearings—

Double-Friction Back Gears—and the simplest type of right-hand control, contribute to an increased production and longer life as a precision machine.

The R. K. LeBlond Machine Tool Company

CINCINNATI, OHIO, U.S.A.

Canadian Agents:

THE A. R. WILLIAMS MACHINERY CO., LIMITED
St. John, N.B. Montreal, P.Q. Toronto, Ont.
Winnipeg, Man. Vancouver, B.C.

E S & M

ELECTRIC

Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

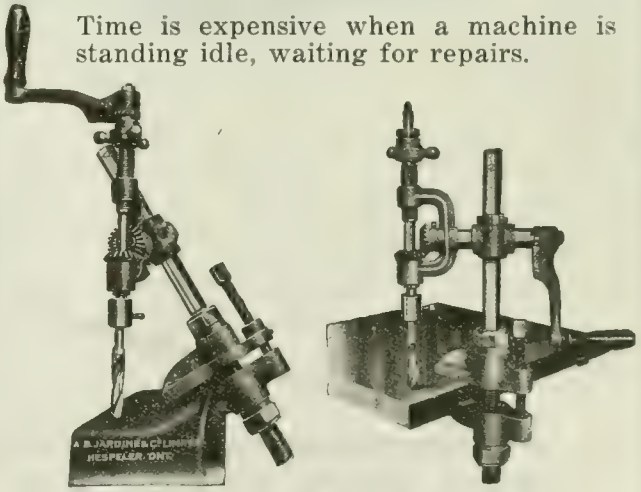
Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED

WELLAND ONTARIO

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net.

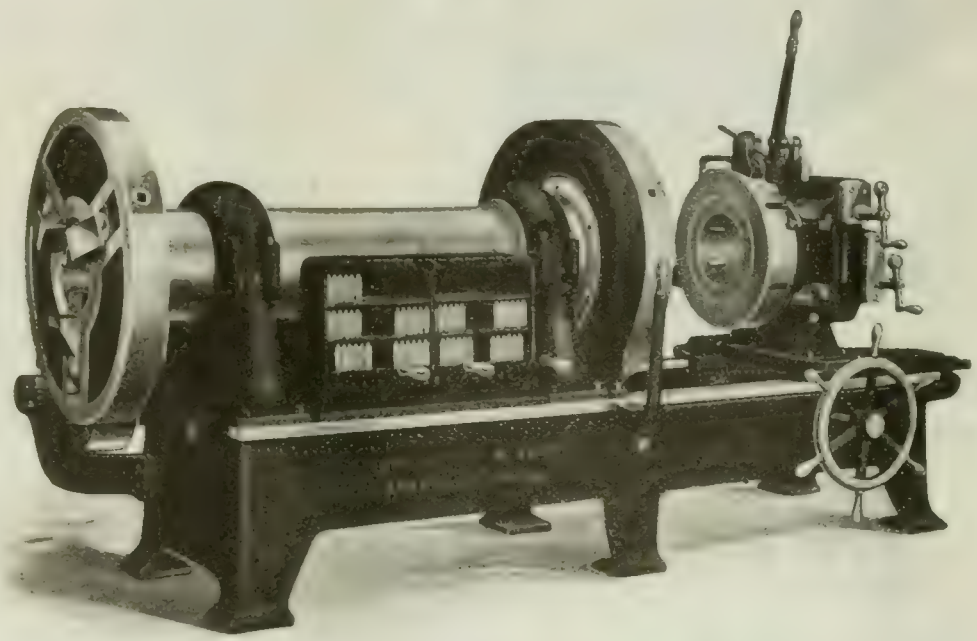
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited

HESPELER, ONTARIO

PIPE MACHINES

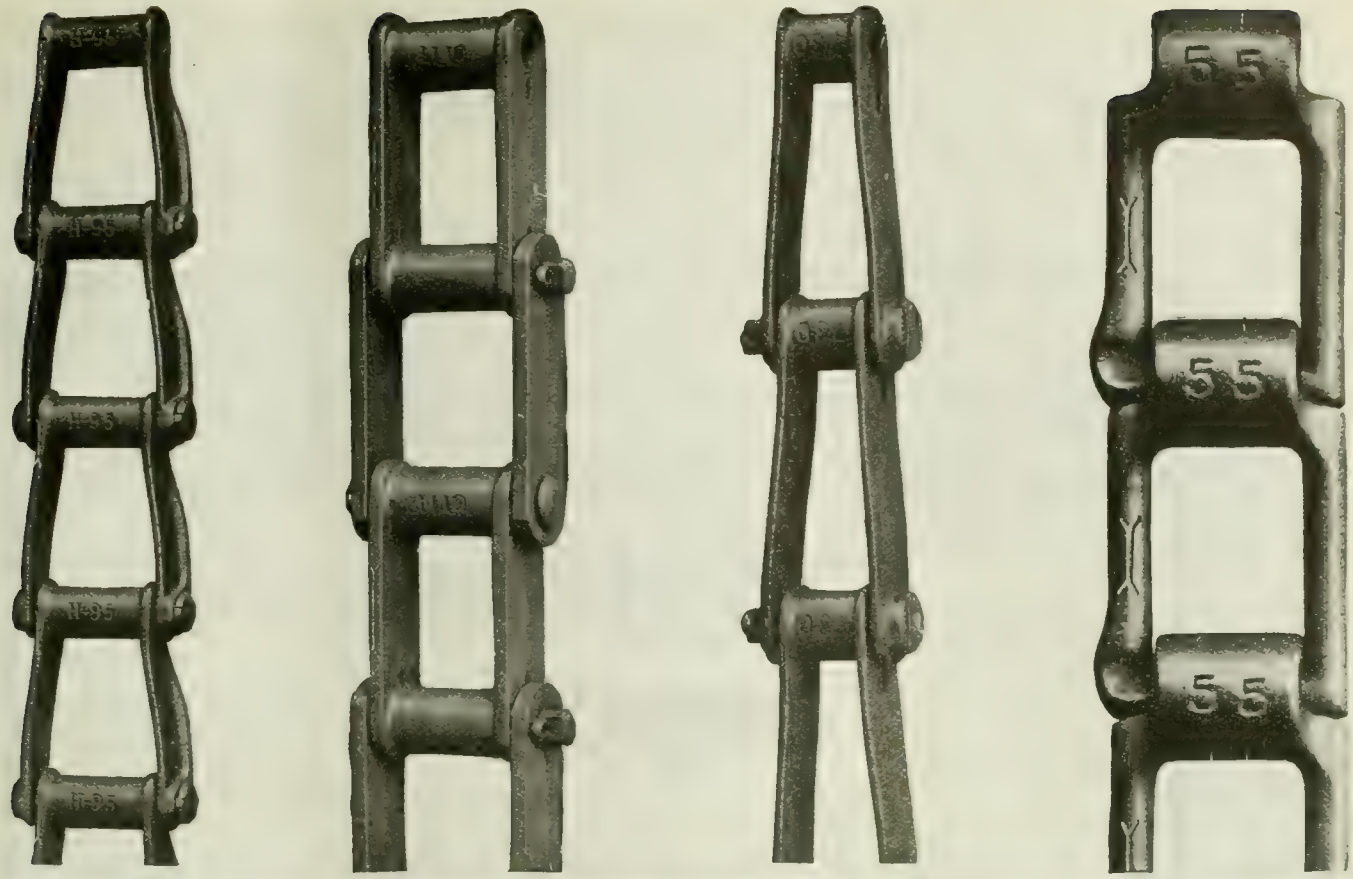
ALL SIZES



No. 8. CAPACITY 2½ to 8.

JOHN H. HALL & SONS
LIMITED

BRANTFORD, CAN.



LINK-BELT
FOR EVERY PURPOSE

Whether your problem is one of power transmission, elevating or conveying we have a type of Link-Belt especially designed for the purpose.

And when we say "especially designed," we mean it. For our engineers have spent years in the study of the peculiar conditions and requirements which various industries place upon Link-Belt. Each type has been designed not with the thought of how cheaply it can be made, but how perfectly it can serve its purpose. We show a few types of Link-Belt above. Our catalog shows many others. Send for a copy.

CANADIAN LINK-BELT COMPANY, LTD.
265 West Wellington St., Toronto

MADE AND CARRIED IN STOCK IN CANADA

If any advertisement interests you, tear it out now and place with letters to be answered.

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times

Are your Tools made of "Red Cut"?

VANADIUM-ALLOYS STEEL CO.

General Sales Offices, PITTSBURGH, PA.
Works, LATROBE, PA.

Where Carborundum Products Go

THE ATLAS BALL COMPANY
PHILADELPHIA, PA.

ACCURACY, uniformity and quality are the three great standards set by the Atlas Ball Company in the production of Atlas steel balls. Atlas steel balls are true to 1/10,000 of an inch in diameter and sphericity. Such a wonderful degree of precision is possible only by grinding.

Carborundum and Aloxite Grinding Wheels

Are used exclusively in grinding Atlas balls

Our service department, by closest application and study, has been able to give wheels that are absolutely uniform in grade and grit; that, therefore, remove just so much stock in a given time; that wear evenly and cut clean and fast, thus making possible a perfectly round ball, within the amazing limits of Atlas accuracy.

Carborundum Wheels rough grind Atlas balls.—Aloxite Wheels finish grind them.—They uphold the Atlas standard of accuracy

Carborundum service is versatile.—It may be able to do with your grinding just what it has done with the Atlas grinding work—that is, master it!

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.

NEW YORK CHICAGO BOSTON PHILADELPHIA CLEVELAND CINCINNATI PITTSBURGH
MILWAUKEE GRAND RAPIDS

"WACO"

TRADE MARK
"WACO"
TRADE MARK

High Speed Steel

"Double Waco" Quality—for Quick Production Work

"Turtle Brand"—High-class Tool Steels, Files, Drills, etc.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada

GEO. A. MARSHALL & CO.
1118 Queen Street West, Toronto, Ontario

Phone Park. 250

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M. A. HANNA & Co.
Sales Agents, CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S Speedicut HIGH SPEED Steel

The Ideal Steel for Machining Shells

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

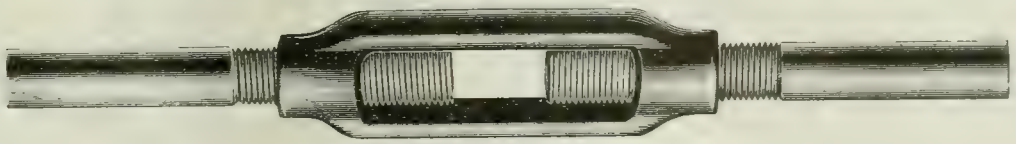
THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES | 449 St. Paul St. West, MONTREAL
79 West Adelaide St. TORONTO

J. A. SHERWOOD
Canadian Manager

CANADA
FOUNDRIES & FORGINGS
LIMITED

DROP FORGED STEEL



TURNBUCKLES
16 Sizes, with or without Stubs
Large Stock---Quick Action
Produced at
Canadian Billing & Spencer Plant
Welland

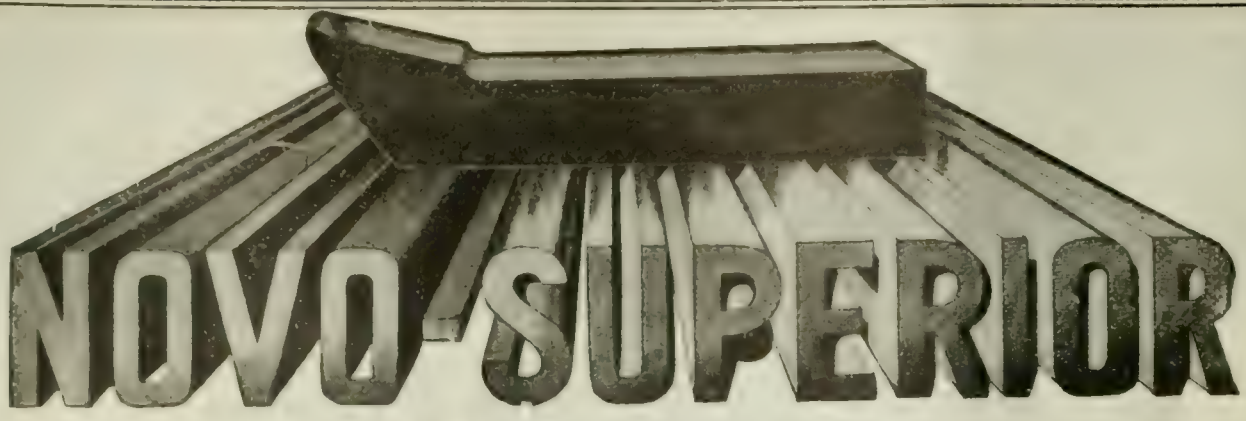
New York Office:
312 Hudson Terminal Bldg.

Buffalo Office:
792 Ellicott Square Bldg.

Detroit Office:
757 David Whitney Bldg.

The Hammond Steel Co., Inc.
Syracuse, N.Y.

High Grade
Crucible and Electric Tool
and
Alloy Steels
Equipped to Meet all Demands
Piercers
Punches and Dies
Made from Special Chrome Vanadium for Shell Piercing
Army and Navy Specifications
All Classes



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
Music Wire for Springs, Steel Balls.
Cold Rolled Mild Steel for Shafting, Etc.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws – for wood and for hot or cold metal cutting
Machine Knives – for cutting wood, paper, tobacco, agricultural.

H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

URANIUM

HIGH SPEED STEEL

Accelerating Production

In these strenuous times the utmost is demanded from machine tools.

Machines with Uranium High Speed Cutting tools do more work in less time. For by the proper addition of Uranium the strength and toughness is greatly increased.

With this extra strength the cutting tools take deeper cuts with greater speeds. So production is accelerated.

Try it out yourself.

STANDARD ALLOYS COMPANY

Forbes and Meyran Aves. **PITTSBURG, PENNA.**

SaBeN ExTrA
HIGH SPEED STEEL

The Highest Achievement of British ToolSteel Metallurgy.

SABEN

H.A. DRURY COMPANY LIMITED
STEEL

MONTREAL TORONTO NEW YORK

2

Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

Quality Service

Brass, Phosphor Bronze, Copper
and
Aluminum Castings
of
Every Description

Over Twenty Years of Foundry Experience at your Service

Tallman Brass & Metal Co.
HAMILTON, ONT.

If any advertisement interests you, tear it out now and place with letters to be answered.

Nova Scotia Steel & Coal Company

Limited

New Glasgow, Nova Scotia, Canada

THREE AND ONE-HALF AND FIVE-TON "FLUID COMPRESSED" STEEL INGOTS.

The Nova Scotia Steel & Coal Co., realizing the importance of "fluid compression" as a valuable aid in producing reliable and first-class steel products, procured by purchase the Canadian license from M. Harmet, of St. Etienne, France, whereby they own the sole rights in this Country to use his process. This they considered in accordance with their policy of taking advantage of every important metallurgical development, thus advancing with modern progress and particularly that their high reputation as manufacturers of the best marine, railway and machine forgings obtainable should be maintained.

The "fluid compression" plant laid down at Sydney Mines, N.S., consists of one group of four Harmet presses, each of 1,250 tons and capacity to handle 3½ to 5-ton ingots; and one of 4,000 tons to handle ingots up to 30 tons.

The product of this process is used in the manufacture of high grade forgings, such as locomotive axles, crank shafts, marine forgings, artillery tubes and armor plate of the highest grade; in fact for all commodities in which maximum reliability and homogeneity of structure enter and are demanded.

If what you need is not listed, consult our Buyers' Directory and write advertisers listed under proper heading.

GEARS

Mortise Gears in Bevels, Mitres and Spurs.
Gears and Pinions accurately machine dressed.
Gear teeth made from best seasoned rock maple.
Pinions of Cast Iron.

Machine Cut Metal to Metal Gears — Bevels, Mitres, Spurs and Angle Gears, made from cast iron, steel and bronze.

Cast Tooth Gears — Bevels, Mitres and Spurs. Complete range of patterns.

Worm Gears — Machine cut in steel, cast iron or brass, made to any specification.

Gear Capacity up to 90 inches diameter.

Specialists in complete power transmission units.

Quotations given on all work—Are prepared to undertake work of installation in connection with any of our contracts.

J. C. WILSON & COMPANY

FOUNDERS and MACHINISTS

BELLEVILLE ONTARIO

Manufacturers "Little Giant" Turbine Water Wheel

STELLITE

"Not Steel but its Master"

STELLITE is not only the hardest metal on the market, but has other qualities possessed by no other metal.

The Alloy can be made in varying degrees of hardness, some of them being malleable.

They are highly resistent to acids being unattacked by Aqua-Regia and resist corrosion to a wonderful degree.

STELLITE might be of inestimable value to you in some of your mechanical difficulties. Consult our Engineering Department.

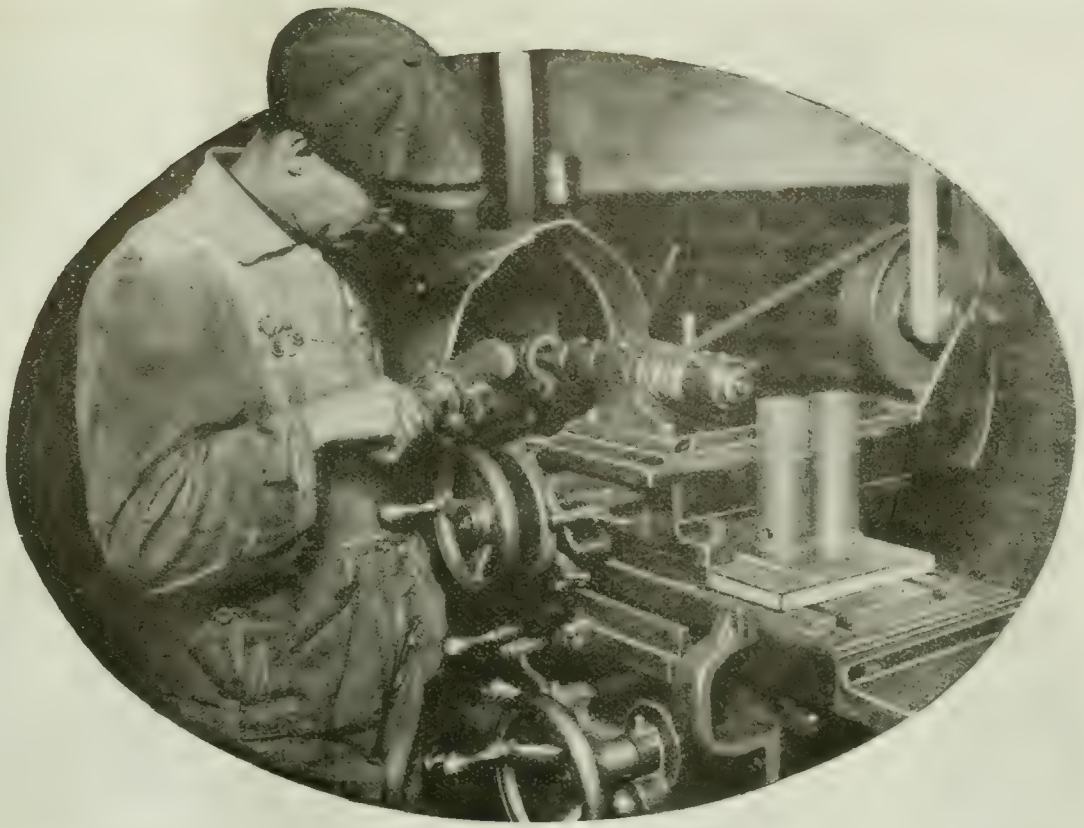
We may be able to plug the leak.

Deloro Smelting & Refining Company, Limited

TORONTO
200 King Street West

H.O. and WORKS: DELORO, ONT.

MONTREAL
315 Craig Street West



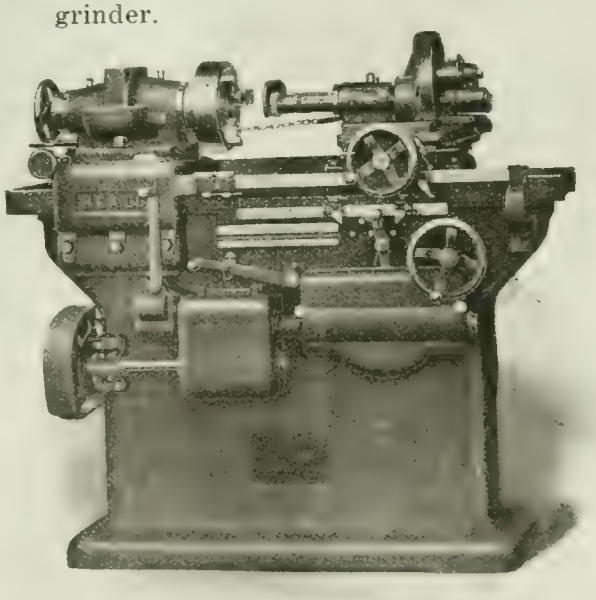
A Heald Internal Grinder Ten Years Old and Still on the Job

This internal grinding machine was installed at the Blanchard Machine Company's plant at Cambridge, Mass., ten years ago, and has been running continuously ever since on production and precision work.

In the above photograph this machine is grinding a steel sleeve from which it removes .025 inches of stock from a hole 1¾" diameter x 3¾" long to limits of plus or minus .0005 in 15 minutes.

Notice the lower cut and see if it is not a machine that you would be proud to have in your shop.

Heald Internals are not limited to accuracy and production, but do angular and face grinding on all kinds of work. Different style heads, instantly interchangeable, make this machine practically a universal grinder.

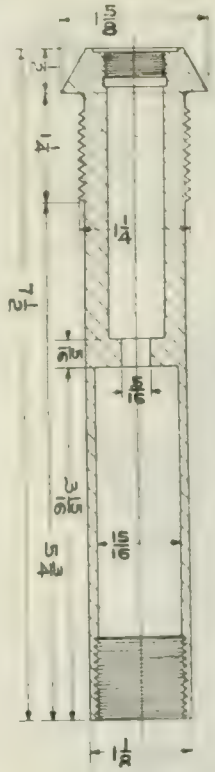


The Heald Machine Co.

Worcester, Mass.

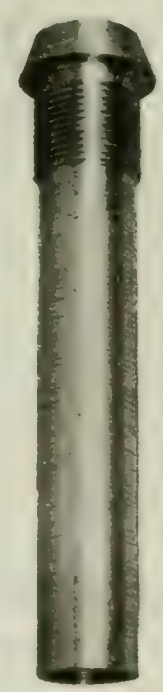
AGENTS: New York, 839 Singer Bldg. Philadelphia, 1408 Commonwealth Bldg. Chicago, 24 South Jefferson St. Detroit, 911 Majestic Bldg. Cincinnati, 311 Provident Bank Bldg. Cleveland, 721 Engineers Bldg.

WESTERN AGENTS: Eccles & Smith Co., San Francisco, Los Angeles and Portland. Salt Lake Hardware Co., Utah and Idaho. FOREIGN AGENTS: Alfred Herbert, Ltd., England. Societe Anonyme, Alfred Herbert, France, Switzerland, Spain and Portugal. Societa Anonima Italiana, Alfred Herbert, Italy. F. W. Horne Co., Japan. Wilh. Sonesson & Co., Sweden, Denmark and Norway.



Warner & Swasey No. 6 Screw Machine

HERE is an example of forced output on a battery of 40 Warner & Swasey No. 6 Screw Machines. (This picture shows one of them) machining detonators—one every 2½ minutes, and the battery in operation day and night. The stock is 1⅞", is drilled 15-16" for a depth of 3 15-16", turned all over, and cut off, ready for the second operation.



Best for Detonators

Piece work is considered best by a great many manufacturers on straight run work of this sort, especially when under penalties for delivery delays. And only the best machines can hold their accuracy under such continuous operation.

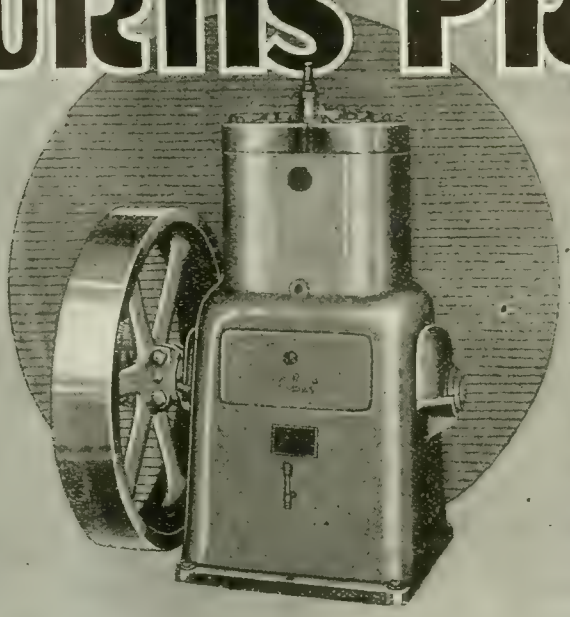
For unusual demands such as this, and for absolute certainty, in making delivery promises, specify Warner & Swasey Turret Lathes and Screw Machines.

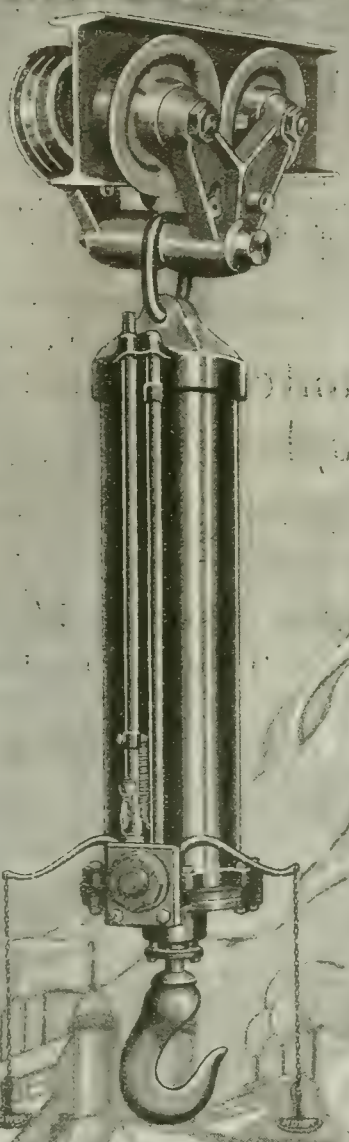
THE WARNER & SWASEY COMPANY
CLEVELAND, OHIO

New York Office Singer Building. Boston Office Oliver Building. Buffalo Office—Iroquois Building
Detroit Office—Ford Building. Chicago Office and Show Rooms 618-622 Washington Blvd.

FOREIGN AGENTS: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Allied Machinery Company, Paris and Turin. Van Rietschoten & Houwens, Rotterdam. Yamatake & Co., Tokio. Benson Brothers, Sydney and Melbourne. A. Asher Smith, Sydney. A. R. Williams Machinery Co., Ltd., Toronto, St. John, Winnipeg and Vancouver. Williams & Wilson, Ltd., Montreal.

CURTIS PRODUCTS





ESSENTIAL

in the Era of Reconstruction

To reduce labor costs, improve methods of handling, and speed up production to meet the after-the-war conditions, CURTIS PRODUCTS are dominant in their field. They are built up to the highest service standard and embody the results of our 25 years of specializing in the manufacture of pneumatic machinery.

Curtis Air Compressors, Pneumatic Hoists, Cranes, and I-Beam Trolleys are carrying a mighty burden of production in scores of America's leading industrial plants — and will be called upon for even greater service in the new and better days to come.

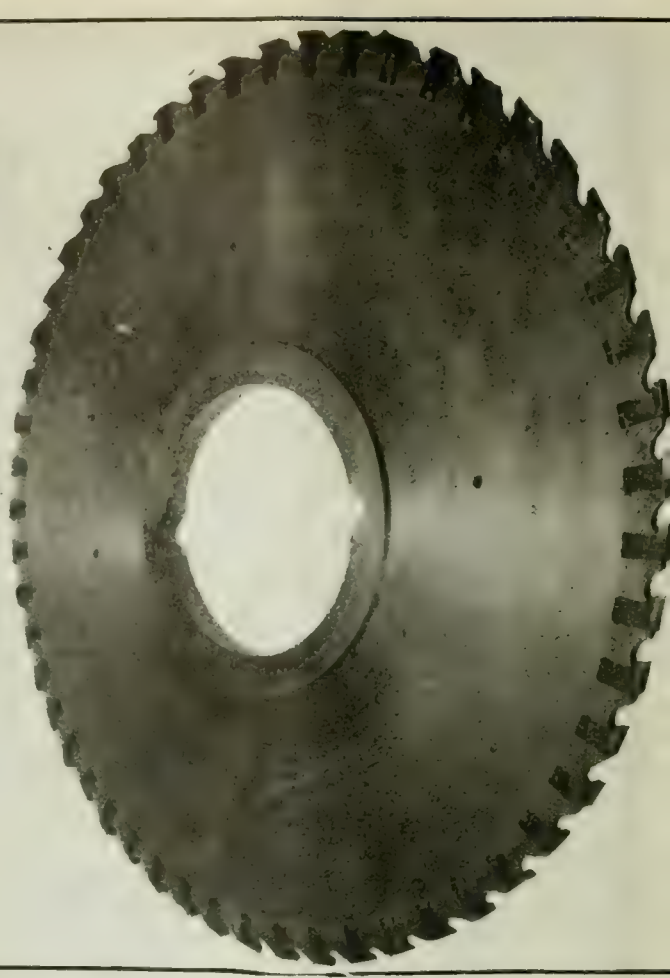
Our engineering staff would appreciate the opportunity of collaborating with you in solving your production problems and recommending the most suitable of the different types of apparatus manufactured under the CURTIS name and guarantee. Catalog No. 63 will be sent on request.

CURTIS PNEUMATIC MACHINERY CO.
1585 Kienlen Ave. St. Louis, Mo.
Branch Office: 532-H Hudson Terminal, New York City

If any advertisement interests you, tear it out now and place with letters to be answered.

90-inches in diameter

Cut on right shows a Hunter Duplex Inserted Tooth Saw used by the Erie Forge Co. for cutting gun forgings. It is the largest inserted tooth saw blade we know of ever having been made in the United States or any other country —1" plate, 1 5/16" kerf, and contains 56 high-speed steel teeth, and weighs approximately 3,000 lbs.

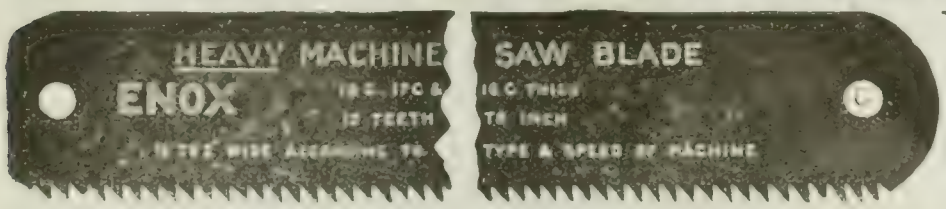


Hunter Duplex Saws

No matter what your sawing requirements may be, there is a Hunter "Duplex" Saw that is just right for the work. The discs are made of Chrome-Vanadium Steel, oil treated.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels. Saw Sharpening Machines. Inserted Tooth Grinders. Hardened Steel Specialties. Write for prices.

Hunter Saw & Machine Co.
Pittsburgh, Pa., U.S.A.

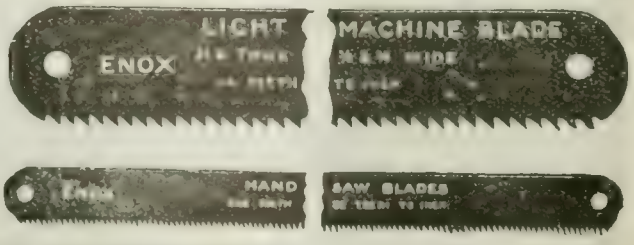


ENOX
Hacksaw Blades
ARE THE BEST

AGENTS IN CANADIAN TOWNS WANTED

Liberal Terms offered to firms willing to carry stocks and act as sole agents for the district.

Sole Makers:
FRY'S (LONDON) LIMITED
AN ENTIRELY BRITISH COMPANY
46 Upper Thames Street, London, E.C. 4, England. Works: Greenwich, S.E. 10



Starrett Hack Saws

for Hand *and* Machine

—*economy* both ways

Whether you use hack saws in hand frames or power machines, the one brand that stands out pre-eminent is the STARRETT.

Starrett because you can depend upon them to give the most efficient service at the least cost per cut.

Use the Starrett Hack Saws in your machines and hand frames. One trial will convince you of their economy.

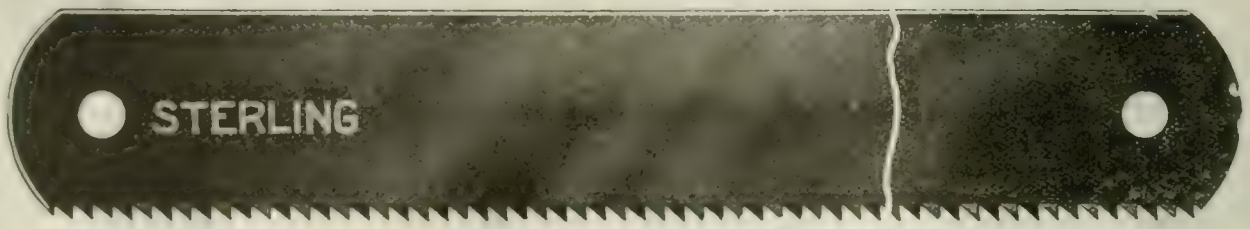
Write for our Catalog No. 213 on fine precision tools and hack saws

The L. S. Starrett Company

The World's Greatest Toolmakers
Mfrs. of Hack Saws Unexcelled

ATHOL, MASS.

"STERLING"
HACK SAW BLADES



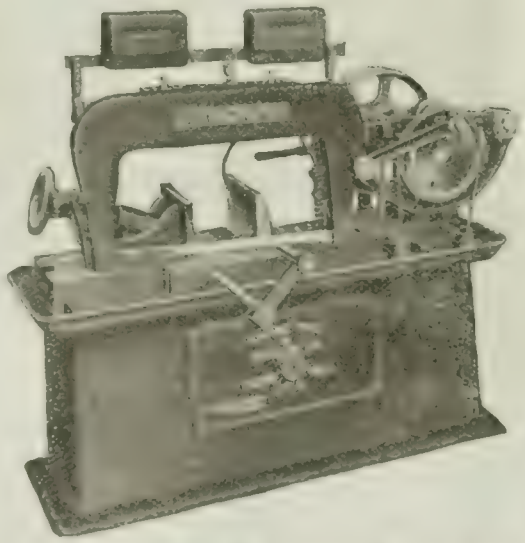
A brand once adopted, difficult to replace.

REASONS—High quality of material used, mechanical construction, and special heat treatment.

RESULTS—Economy, which means satisfied customers.

Write for information and prices.

DIAMOND SAW & STAMPING WORKS
BUFFALO, N.Y., U.S.A.



Use "RACINE" H. S. Tungsten Power Blades

Only on the draw stroke does the blade of

THE "RACINE"
High Speed Metal Cutting Machine

come in contact with the metal—then

How It Cuts---Deep and Quick

Machine is of substantial construction, designed for accuracy, for speed, for long service of both machine and blade.

The "Racine" is the only machine that duplicates every cut exactly. It has no equal for quantity of accurate work done in a day, in a year, in a lifetime.

Proof for the asking.

Standard the World Over

Racine Tool & Machine Company
Melbourne Ave., Racine, Wis., U.S.A.

Kelly "Production" Tools that "Produce"

Here it is, Mr. Manager

"A TOOL ROOM IN ITSELF"

Every size in Roughing and Finishing reamers from 1" to 5⅜" diameter in Fractional or Metric sizes. No matter how odd the size, it's there. No delay, no holdup in production, always Ready for Service. They Adjust.

Indispensable to your tool room, Turret Lathe or Screw Machine Department. No machine shop should be without this set.

READY FOR SERVICE

READY FOR SERVICE

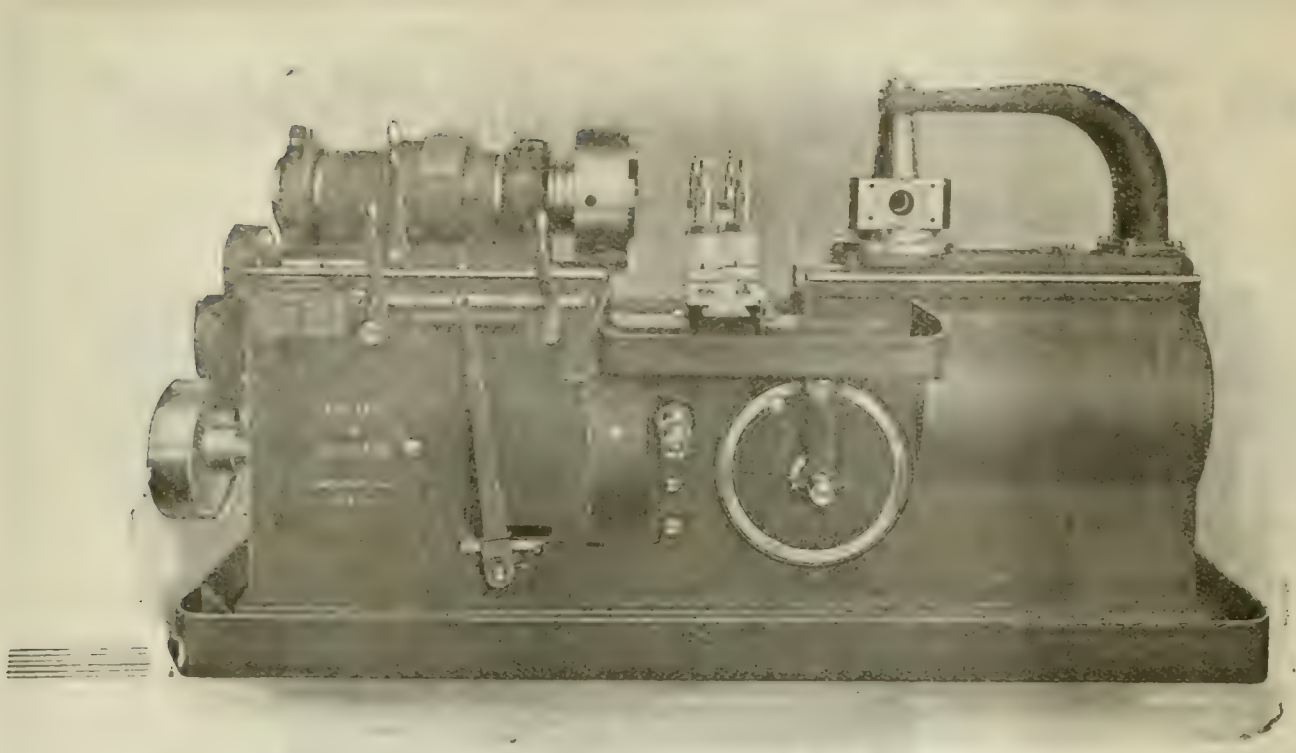
Just one of the KELLY TOOL FAMILY

Write for our new catalogue J-4 and see THEM ALL.

THE KELLY REAMER COMPANY

CLEVELAND, OHIO, U. S. A.

Burton, Griffiths & Co., Ltd., London, English Agents
40 Domestic Agencies
Burton Fils, Paris, French Agents



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

Increased output means reduced cost *both* are readily obtained on

Potter & Johnston Manufacturing Automatic

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

Catalog gives full particulars. Drop a card for it.

Canadian Offices : POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

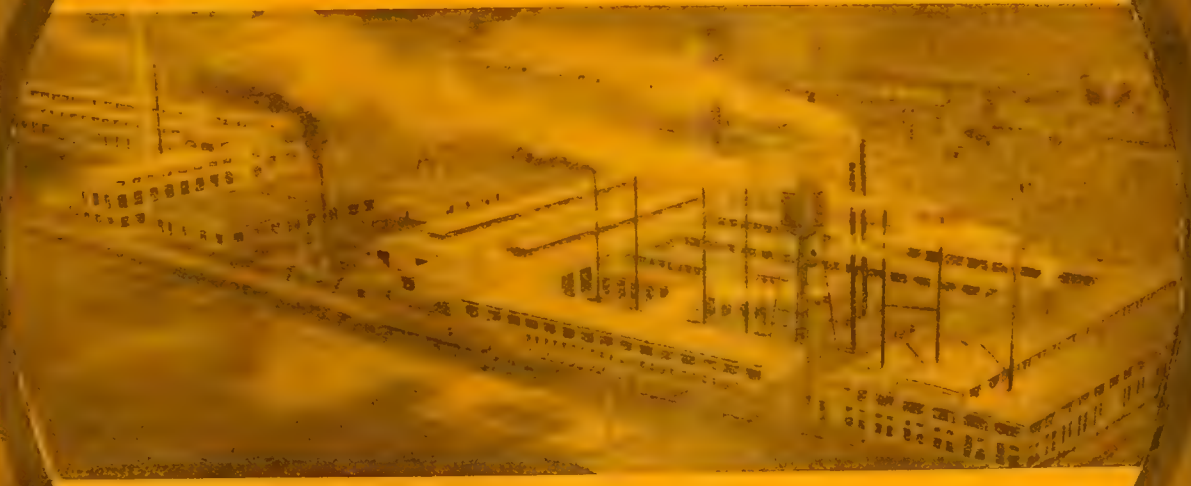
ROELOFSON MACHINE & TOOL CO., LTD

Head Office : 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse : Galt, Ont., Canada

BROWN'S

Beaver Brand Metals

Copper, Brass, Bronze, Canada Silver, and Gilding Metal in sheets, rolls, plates and rods. Naval Bronze, Yellow Metal and Muntz Metal in sheets and rods for shipbuilding requirements. Specify Beaver Brass Rod for drilling and free cutting. Extruded shapes.



Seamless Brass and Copper Tubes.
Guaranteed Ingot Metals—Yellow, Red and Composition Ingots.
We are Purchasers of Copper Bearing Material.

Link up with Beaver Brand Products—you'll like the quality, price and service.

Brown's Copper & Brass Rolling Mills, Limited

New Toronto, Ont., Can.

COPPER & BRASS BROWN'S QUALITY ROLLING STOCK

MADE IN CANADA

Malleable and Cast Iron PIPE FITTINGS

Both Screwed or Flanged,
Black or Galvanized—All Sizes

MALLEABLE AND GREY IRON CASTINGS

For General Machine Shop Work, for Manufacturers of Automobiles and Specialty Manufacturers.

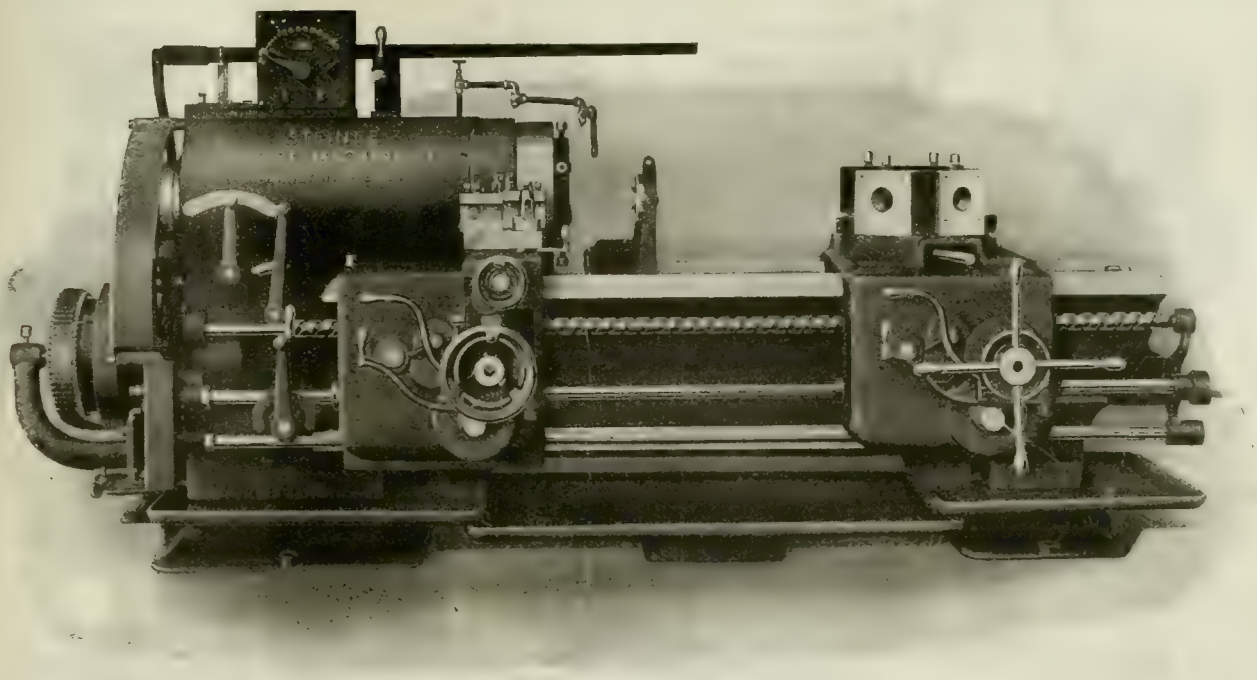
Quality Products

We have the facilities for filling your orders with exceptional promptness. Annual capacity 6,000 tons.

Prompt Service

International Malleable Iron Co., Limited

Guelph, Ontario



WE are proud—and we believe justly proud—of the part the Steinle 24″ Full Swing Side Carriage Turret Lathe has played in helping to win the war. We sent this machine over the top first in the production of Liberty motor cylinders, 155 mm. shells, field artillery wheel hubs, and many other parts required in various classes of material used to prosecute the war. We have been on a 100% war footing.

Now we are ready to send it over the top again. This time on a 100% peace footing, helping the Canadian industrial manufacturer and Canadian farmer by turning out parts entering into the construction of a wide range of mechanical equipment required in industrial and agricultural enterprises.

This machine was originally designed during peace times as a general purpose high duty turret lathe, and it has an enviable record as a producer on industrial and railroad.

Send us drawings of tractor parts, such as cylinders, where cast singly, pistons, piston rings, transmission cases, differential housings, axle housings, hubs, transmission gears; stationary and marine gas engine parts, such as pistons, rings, fly wheels, gear blanks, etc.; locomotive parts, such as wrist pins, knuckle joint pins, valve motion pins, brake hanger pins, washers and collars of the larger sizes, air pump pistons, rings and heads, piston valves, bull rings and followers, small size pistons and rings, or any piece, such as castings of any kind of material up to 21″ in diameter that require boring, facing, or turning operations; forging requiring similar operations, or large pieces that it is desired to make from bar stock.

Our engineering department will gladly furnish production estimates on pieces shown on drawings furnished.

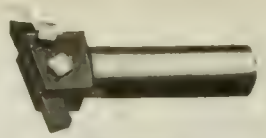
There are reasons why the Steinle 24″ Full Swing Side Carried Turret Lathe is ahead of all others in the economical and accurate production of many classes of work. We will give these reasons in future advertisements in this Journal. Watch for them. They will be interesting to you.

STEINLE TURRET MACHINE COMPANY

MADISON, Wisconsin, U.S.A.

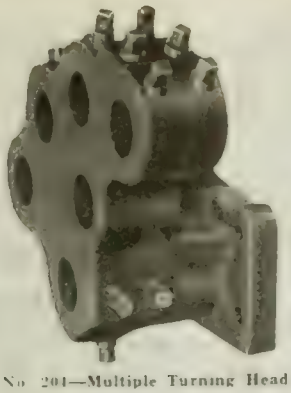
If any advertisement interests you, tear it out now and place with letters to be answered.

No. 203—Slide Tool

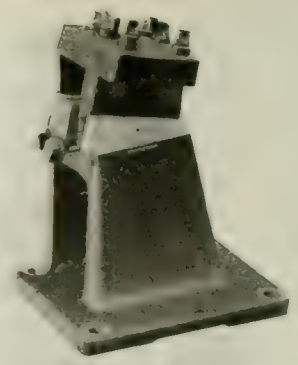


No. 204-A
Angle Cutter Holder

No. 204-B
Straight Cutter Holder



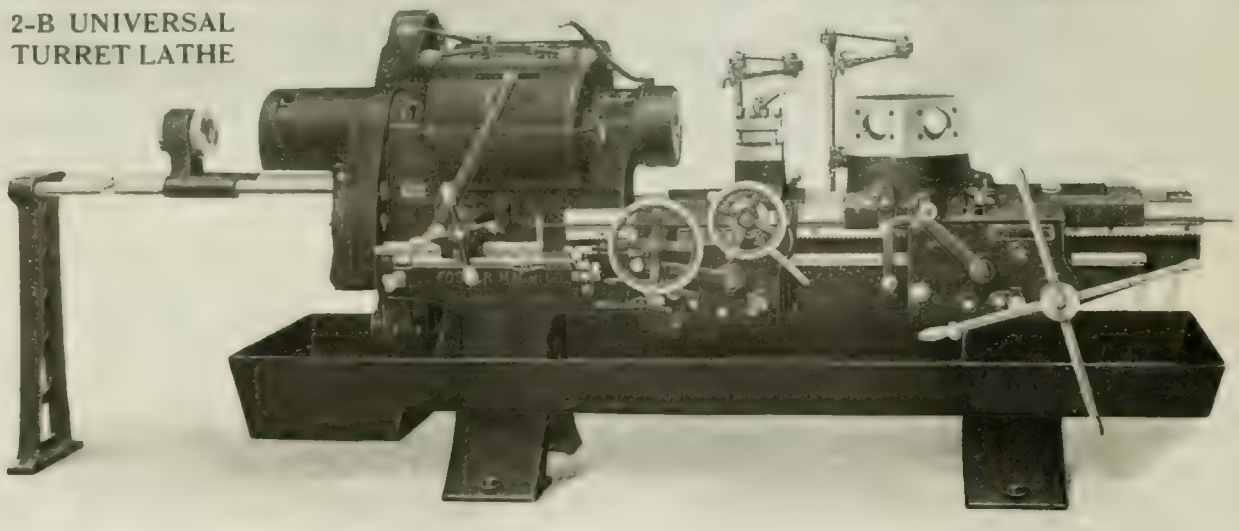
No. 201—Multiple Turning Head



No. 210—Rear Tool Holder

THE MACHINE WITH THE TOOL EQUIPMENT

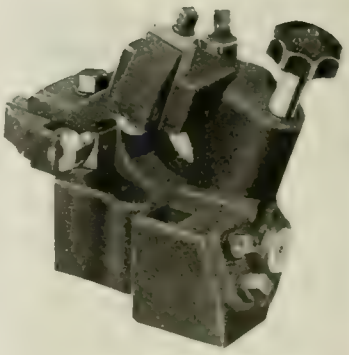
2-B UNIVERSAL TURRET LATHE



Push-Out Collet with Bushings

This is the equipment that you need to reduce your production cost to a minimum now that the war is over and the time of keen competition is here once more.

Don't delay. Investigate the merit and the tremendous capacity of production of the Foster 2-B Universal Turret Lathe. Send us blue prints of your work and give us an opportunity to show you what this machine can do.



No. 199—Single Cutter Turner

THE FOSTER LINE

No. 1 B UNIVERSAL TURRET LATHE
Bar Cap. 2" Swing over Carriage, 14" over Cross Slide, 8"

No. 2 B UNIVERSAL TURRET LATHE
Bar Cap. 3 ¼" Swing over Carriage, 20" over Cross Slide, 13 ¼"

No. 0 PLAIN HEAD SCREW MACHINE
Bar Cap. ½" 10" Swing

No. 1 PLAIN HEAD SCREW MACHINE
Bar Cap. ¾" 11" Swing

No. 2 PLAIN AND FRICTION HEAD SCREW MACHINES
Bar Cap. 1" 13" Swing

No. 3 PLAIN, FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1½" 14½" Swing

No. 4 FRICTION HEAD SCREW MACHINE
Bar Cap. 1" 17" Swing

No. 5 FRICTION AND ALL GEARED HEAD SCREW MACHINES
Bar Cap. 1½" 19" Swing

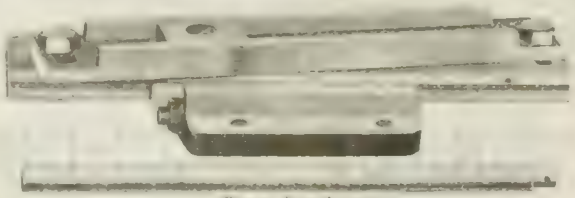
No. 6 "B" AND "D" FRICTION HEAD SCREW MACHINES
Bar Cap. 2" 22" Swing

No. 2 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 1½" 15" Swing

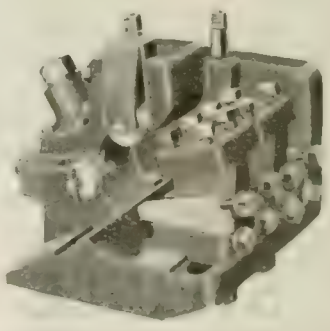
No. 3 FRICTION HEAD UNIVERSAL TURRET LATHE
Bar Cap. 2" 19" Swing

No. 3 FRICTION HEAD SELF-OPENING TURRET LATHE
Bar Cap. 1½" 15" Swing

THREAD MILLERS
Manufactured under the Hanson & Whitney Patents



Taper Attachment



No. 200—Multiple Cutter Turner

FOSTER MACHINE COMPANY, ELKHART, IND., U.S.A.

EXTRA POWER BELTING

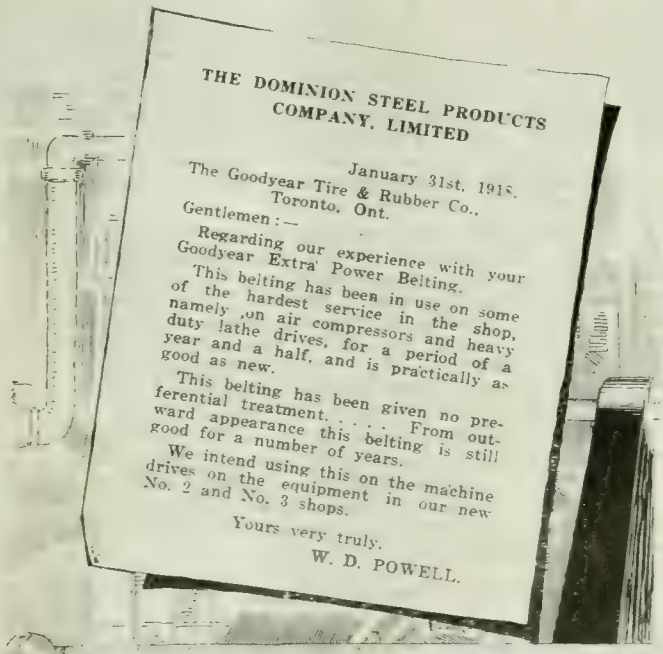
GOODYEAR

MADE IN CANADA

100% Service at a Saving in Cost

The swing to Extra Power Belting in Canadian Industry is unmistakable and rapid. As production demands become more insistent—as executives search more deeply into the means of increased efficiency—the sales of Extra Power Belting become larger and easier.

A dominant factor in the widespread knowledge of Extra Power's better transmission is the frank enthusiasm of those who use it. Their enthusiasm prompts them to write us about Extra Power.



THE DOMINION STEEL PRODUCTS COMPANY, LIMITED

January 31st, 1918.

The Goodyear Tire & Rubber Co.,
Toronto, Ont.

Gentlemen:—

Regarding our experience with your Goodyear Extra Power Belting.

This belting has been in use on some of the hardest service in the shop, namely, on air compressors and heavy duty lathe drives, for a period of a year and a half, and is practically as good as new.

This belting has been given no preferential treatment. . . . From outward appearance this belting is still good for a number of years.

We intend using this on the machine drives on the equipment in our new No. 2 and No. 3 shops.

Yours very truly,

W. D. POWELL.

The experience of the Dominion Steel Products Company will point the way for other industrials who have war-time belting problems. At first dubious as to quality, they are now Extra Power enthusiasts. They say: "This belting has been in use on some of the hardest service in the shop . . . for a year and a half . . . and is practically as good as new." That the test was unprejudiced is evidenced in their statement: "This belting has been given no preferential treatment." They pay final tribute to Extra Power in the last paragraph of their letter: "We intend using this in our new No. 2 and No. 3 shops."

You, too, can make the savings that Extra Power brings. The savings that come from long life; from pulley-gripping flexibility and friction surface; from absence of stretch; from greater transmitting ability.

There are men in the Goodyear organization who are belting trained. Their business is to sell Extra Power only where it will give greater value. A telephone call or letter to the nearest Goodyear branch will bring one of these men to see you.

The Goodyear Tire & Rubber Co. of Canada, Limited

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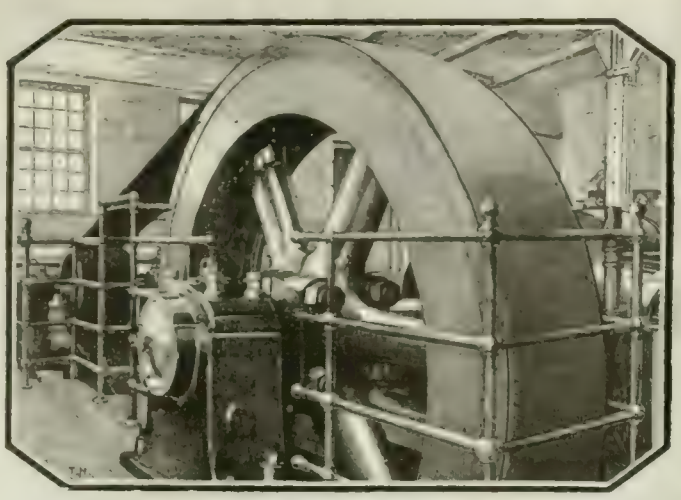
Service Stocks in Smaller Cities

GRATON AND KNIGHT



GRATON AND KNIGHT

Doing the thing that "Couldn't Be Done"

This Graton & Knight Spartan 24-in. double belt was installed in July, 1912, on a generator drive in the plant of the Bosch Magneto Co., Springfield, Mass. The extremely short pulley centres caused some belting men to throw up their hands and say, "It can't be done." But this Spartan Belt has been doing it successfully for more than six years. Now, note its low cost. At the purchase price per foot, the bill figures ninety-six cents per week or .004½ per delivered horsepower per week.

The above result, at so low a cost, is due to the Graton & Knight standardization—using the right belt for the work to be done, at a price that it ought to cost—no more and no less. Economy in belting means the longest and best service possible under given conditions. We make all kinds of leather belting for all uses—large or small.

The nature of the drive always governs the wear of any belt. Two belts of exactly the same quality on two different drives will make showings varying greatly in length of service. Using Graton & Knight Standardized Series Leather Belts means full delivery of power for every dollar invested.

The G. & K. Idea is economy through standardization. It means the right belt in the right place.

For example, Spartan—the belt illustrated—is especially adapted for hard drives, high speed, intermittent loads and where belts are subjected to the action of steam, oil, water and other agencies destructive to ordinary belting. It may be that you are using too good a belt for some purposes and belts not good enough for another. Cost Equalization will spell Economy for you in capital letters.

One factor in the solution of *your* belting problems is the use of belting made from properly tanned leather. The hide of a steer is Nature's tough, elastic, resilient protection during years of activity. G. & K. tanning *preserves* all of those qualities. Nothing can really take the place of the matted *fibre* of leather which locks and unlocks in response to the demands of expansion and contraction, to the very end of its life.

It will save you money to let us recommend belts for every drive in your plant. Then, in buying specify "Graton & Knight——Brand or equal." This does not commit you buying our belts. It does put your buying on the one economical basis of the work to be done.

Write for Booklet on Standardization as applied to Belting

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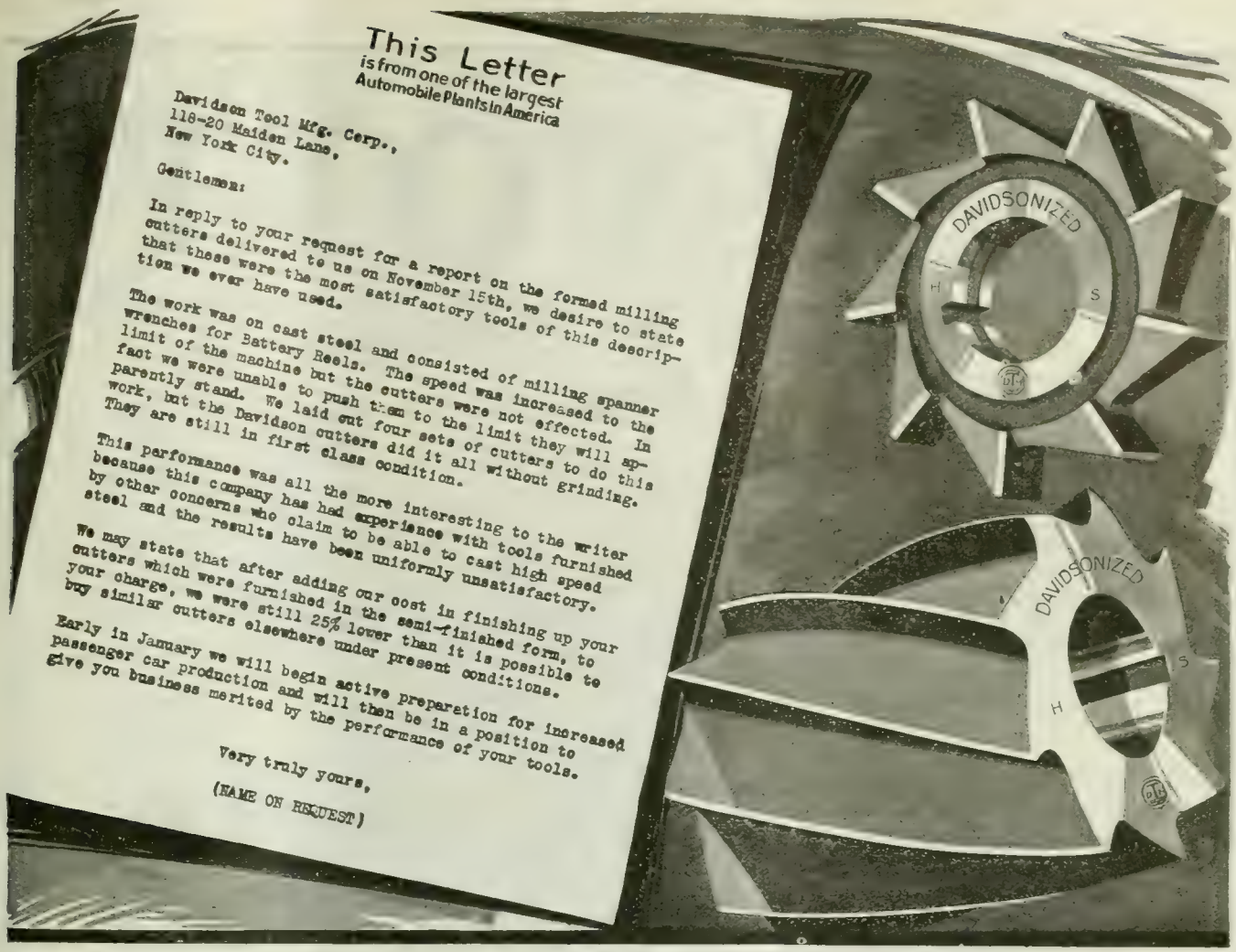
GRATON & KNIGHT

Standardized Series

LEATHER BELTING

Tanned by us for belting use



Cold Facts Convince Them All

300% Better Performance; 25% Saving in Tool Cost

Such a performance is beyond our guarantee and cannot be expected in every case. Yet we continually receive reports of similar remarkable records by

DAVIDSONIZED
High Speed Steel Tools

The biggest plants in the country are providing proof after proof of the increased production, longer service and tool-making economy which this remarkably advanced steel makes possible.

We guarantee any tool of Davidsonized High Speed Steel to give you at least 10% better service than any other tool you have been using on corresponding work. You will be the sole judge.

Such an increase, figuring factory overhead and labor, multiplies several times over the value of the tools.

Note our "Special Service" feature. It applies to standard tools, but is especially desirable for tools made to unusual shapes and other specifications.

Davidson "Special Service" costs you less than to bring your tools from the bar to the stage at which we furnish them. It eliminates loss by cracking in hardening. And it gives you **better** tools than you are now using, tools that increase production and last longer. Send us a trial order; you run no risk; our guarantee assures that. Correspondence invited.

SPECIAL SERVICE

We will supply Davidsonized Tools, semi-finished and easier to machine than any carbon tool steel, within approximately 1 64 of finish on face, 1 64 in bore and 1 32 in diameter, leaving only the final hardening and sharpening to be done in your tool room. A tool that takes 20 hours to make from the solid bar can easily be finished from a Davidsonized blank in about two hours. And we will guarantee our tools against breakage in hardening.

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WALCOTT LATHES are in demand, but our increased facilities put us in a position to supply all Canadian requirements.

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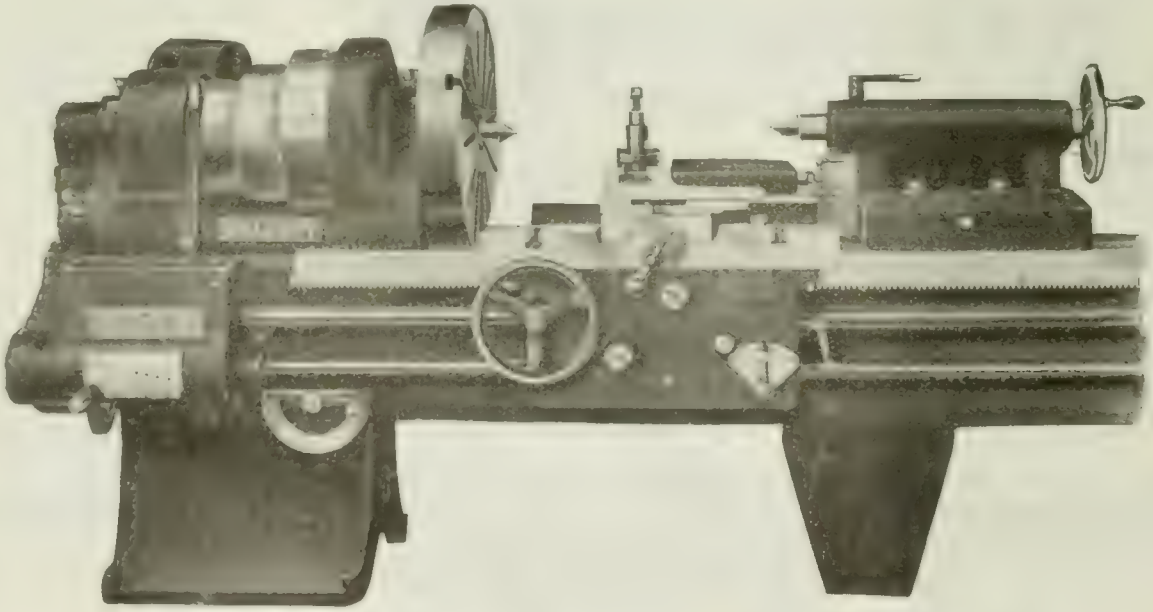

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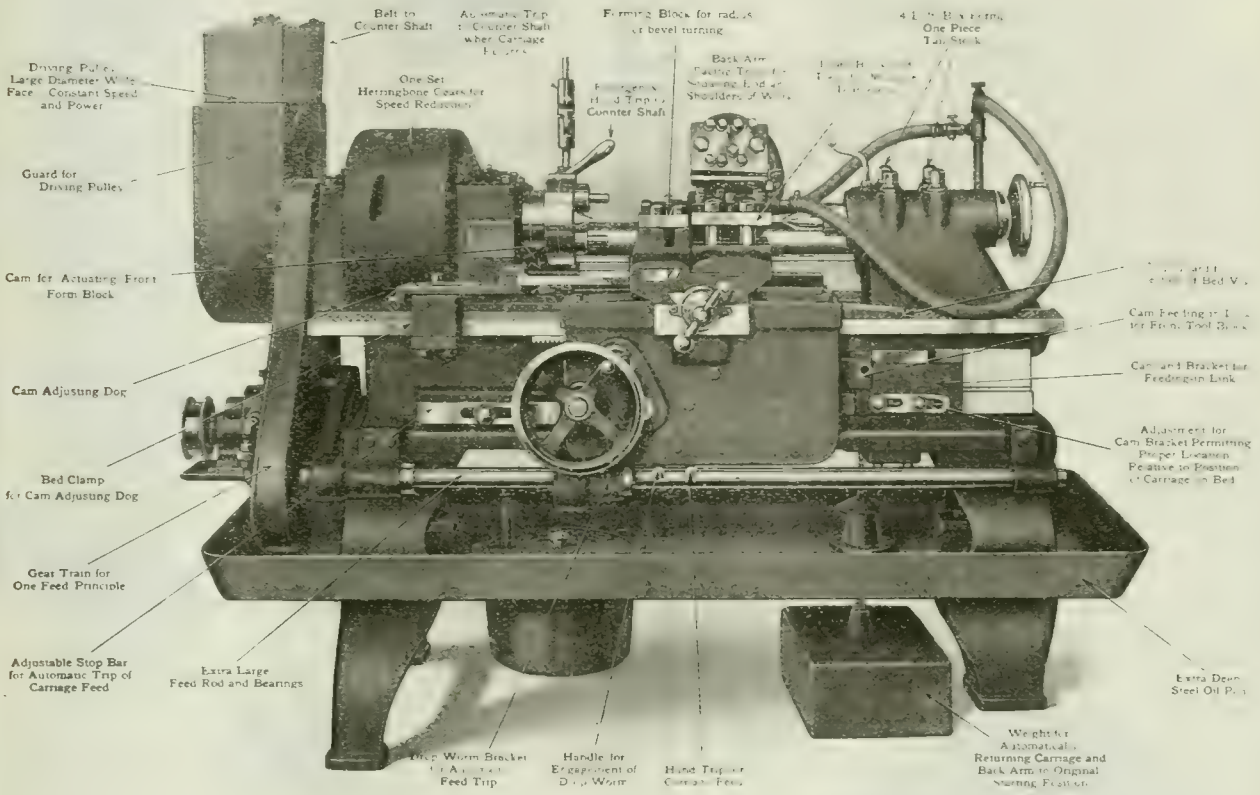

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SHOULD YOU CARE TO SEND US ANY SAMPLES OR BLUEPRINTS OF YOUR WORK WE WILL BE GLAD TO SEND YOU ACCURATE FIGURES OF WHAT YOU COULD EXPECT FOR PRODUCTION FROM THEIR USE AND THE METHOD WE WOULD USE TO GET THE RESULT.

SINCE QUANTITIES OF THESE MACHINES ARE USED IN VARIED LINES OF MANUFACTURE WE CAN GIVE YOU MANY EXAMPLES OF SATISFACTORY PRODUCTION SIMILAR TO YOURS FOR REFERENCE.

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If any advertisement interests you, tear it out now and place with letters to be answered.

Notes on Grinding

NORTON COMPANY, WORCESTER, MASS.

No. 24A

How to Test and Mount Grinding Wheels

Tighten the flanges only enough to hold the wheel firmly, avoiding any unnecessary strain. The importance of this statement is emphasized by the fact that in a 1½" floor stand, equipped with 8" standard relieved flanges, a man with a 24" wrench can easily exert a crushing pressure between the wheel and flanges of 3,600 pounds, or over 1¾ tons.

Every grinding wheel should be protected with a hood—in fact, in many States it is necessary to use a hood to comply with the laws for safety and dust removal. The hood should have some method of adjustment so that the top end may follow the wheel as it wears, thus giving ample protection for small wheels as well as large ones. If grinding is done dry, the hood should be connected with a suitable dust-removal system. After the wheel is in place, the hood should be adjusted to the side of the wheel and the rest should be so adjusted that work cannot be caught between the rest and the wheel. Spark brushes, glass shields or similar appliances may be used if desired.

The machine is then ready to start up, but after running a few minutes it should be stopped and a second inspection made to make sure that all parts have remained properly adjusted. Every grinding machine should be inspected each morning by some responsible person before the day's work begins.

There is a correct abrasive for every grinding operation, and Norton Grinding Wheels, with that correct abrasive, can be provided.

NORTON COMPANY

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Grinding Wheel Plants, Worcester, Mass.

ELECTRO FURNACE PLANTS NIAGARA FALLS, N.Y. and SHAWINIGAN FALLS, ONT. NEW YORK OFFICE 311 CHAMBERS ST. and WAREHOUSE 311 CHURCH ST.

Simplified Marking!

Canadian munition plants who have adopted Matthews Marking Tools find their marking operations simplified, done better and at a reduced cost.

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type are designed to simplify and cut the cost of interchangeable marking. Strong spring attachment of holder and grooved type keep letters and figures secure and assures accurate, straight line work. MATTHEWS' line of marking tools meet all your requirements. Send for catalog.

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Steel Lettering Dies and Stamps

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"METALWOOD"

Hydraulic and Hydro-Pneumatic Quick Operating Presses for Straightening, Forcing and Broaching operations.

Hydraulic Accumulator Systems complete; Pumps, Valves, Forged Steel High Pressure Fittings, etc.

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GTD

Precision in threading can be attained only by the use of Precision tools.

The "Gun" Tap

The "Gun" Tap holds all records for accuracy, speed and durability. Its shearing cut requires a minimum of driving power and is self-cleaning — it shoots the chips ahead.

The "Gun" Tap maintains its size and lead in any material.

The Acorn Die

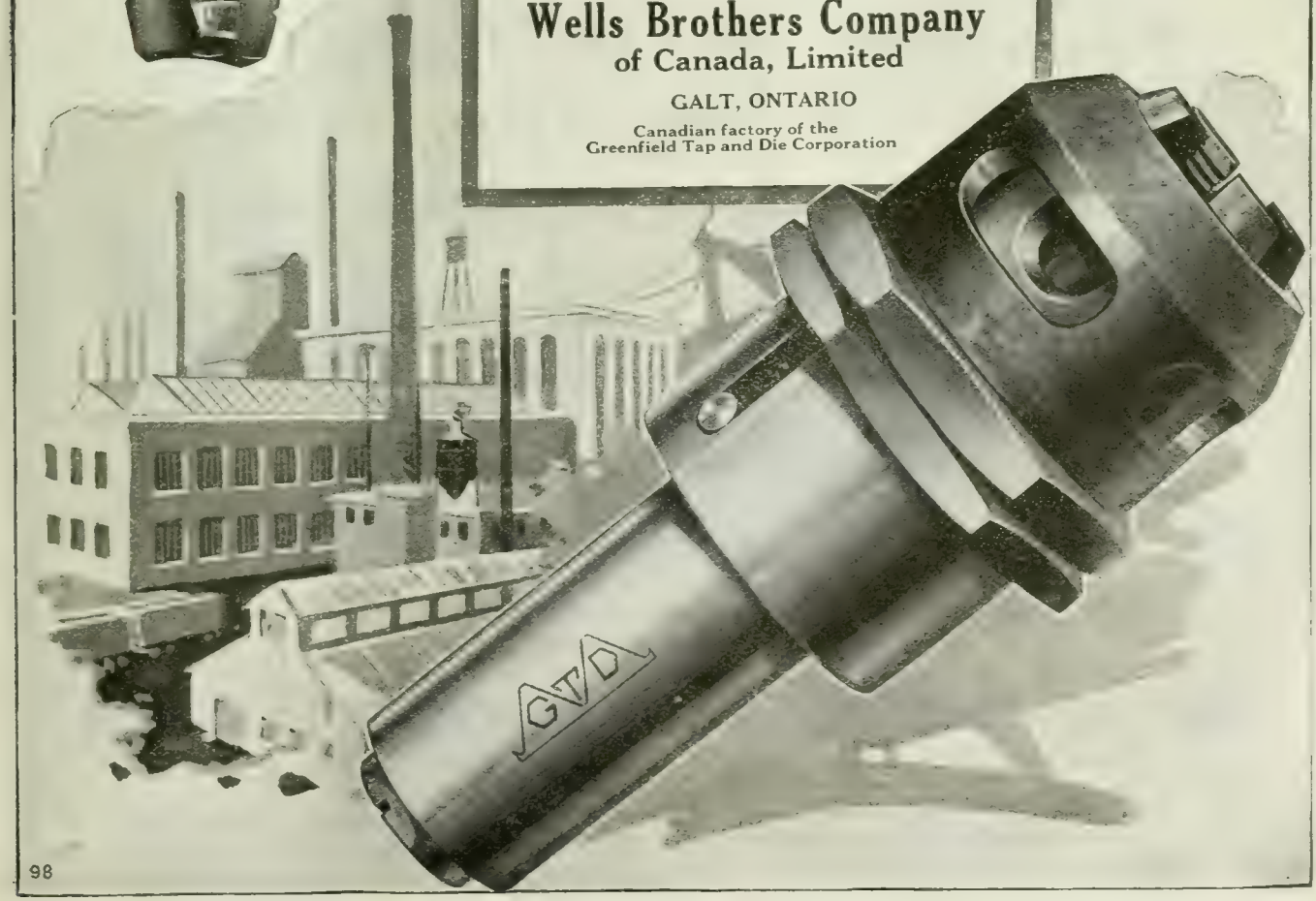
The Acorn Die is capable of a minute adjustment, holds its lead with accuracy, is absolutely rigid while cutting and will outwear a number of ordinary dies.

Nicely illustrated booklets describing the "Gun" Tap and the Acorn Die will be sent on request. Also new No. 40 Small Tools Catalog.

Wells Brothers Company of Canada, Limited

GALT, ONTARIO

Canadian factory of the Greenfield Tap and Die Corporation



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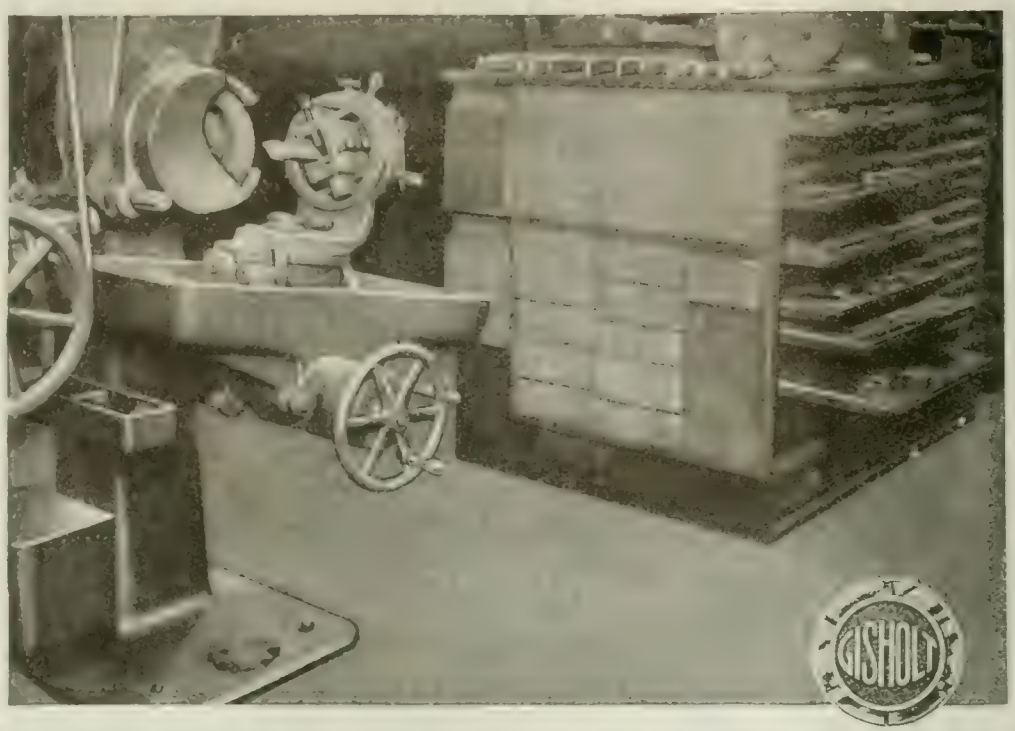


Gisholt Tool Grinder

Fewer Tools Will Do If You Can Keep Them Correctly Ground

Correctly ground tools last longer and work faster than incorrectly ground tools—we all know that. Also, the use of the Gisholt Tool Grinder helps you to establish a system by means of which tools are collected at regular intervals, ground properly and returned promptly to the machines where they are used.

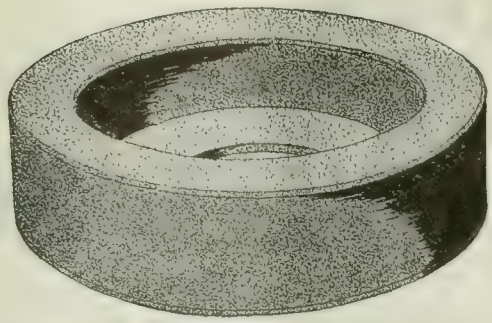
Not only are the tools ready when and where they are needed, but the tool investment is actually lower in an ideal condition such as this than where each man grinds his own tools.

Let us tell you more about the Gisholt Tool Grinder

Gisholt Machine Co., Madison, Wis., U.S.A.

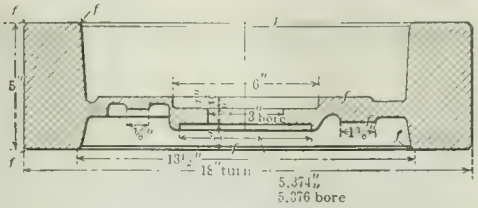
Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria



GISHOLT
Turret Lathes
and Standard Tools

21 MINUTES



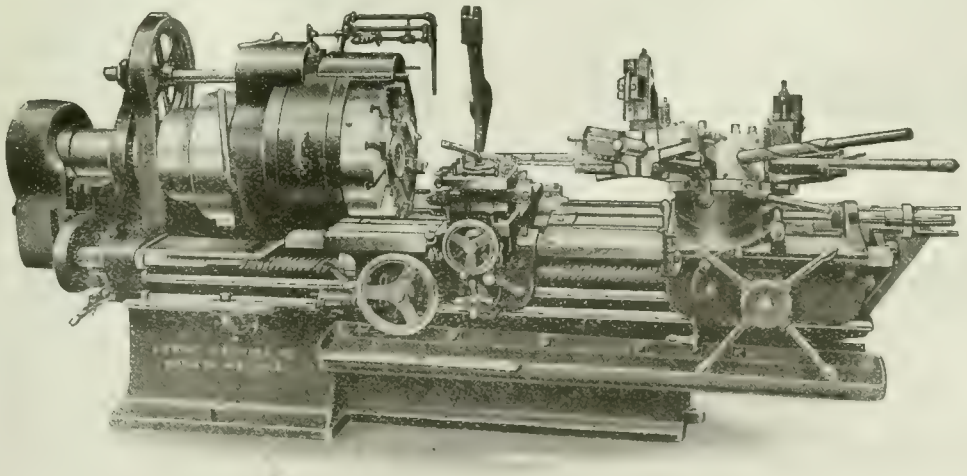
These Cast Iron Fly-Wheels 21 Minutes

There is a Gisholt booklet that shows work such as the above, and many other Gisholt jobs. Just drop us a line telling us to whom the booklet should be addressed.

Gisholt Boring Bar Cutters and Facing Heads are adjustable. These and other standard chucking tools have been developed to cover a wide range of work, thus affording users of Gisholt Turret Lathes an initial saving in the cost of tool equipment as well as a big saving in time in tooling up for a new job.

Why not put Gisholt Turret Lathes to work and pocket the profits their use insures?

If you want to increase output we'll be glad to show you the way we would do it.



Send for the Gisholt Booklet

Gisholt Machine Co., Madison, Wis., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

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EVERYTHING MECHANICAL

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The World's Standard for over 90 years---
The Scales that made weighing
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Our stocks are the largest in Canada

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CANADIAN MACHINERY
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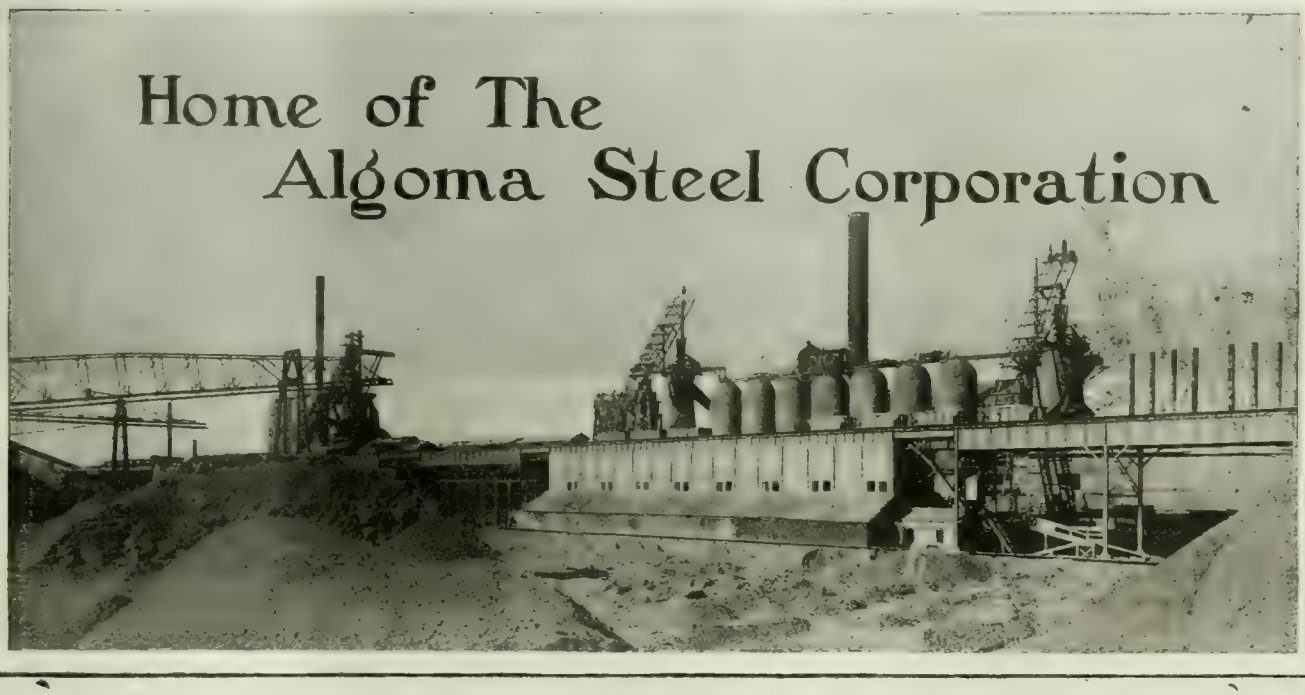
MANUFACTURING NEWS

Volume XXI. No. 6. February 6, 1919

Home of The Algoma Steel Corporation



By T. H. FENNER

SITUATED at Sault Ste. Marie, Ontario, on four lines of railway, and with direct water communication to all points on the Great Lakes, the Algoma Steel Corporation is well located for the reception of its raw material, and the dispatch of its finished products. The railways communicating with the plant are the C.P.R., the Algoma Central and Hudson Bay R.R. Co., the Minneapolis, St. Paul, and Sault Ste. Marie, and the Duluth, South Shore and Algoma Railroad. On the lake the corporation has a frontage of four miles, and the acreage covered at present is 60 acres. The corporation has 2,300 acres available when required. The plant has a capacity of 40,000 tons per month.

The Coal Dock

The coal receiving dock is 700 feet long, and is served by three clams, each of 300 tons per hour capacity, or a total of 900 tons per hour. The capacity of these clams per month is 150,000 tons. The clams dump into 20-ton hopper trucks mounted on a trestle, which runs the full length of the coal storage, and delivers on each side of the pile, keeping the high volatile and low volatile coals on their respective piles. The length of the coal storage is 1,700 feet, and 300 feet wide, and the amount of coal that can be stored is 375,000 tons. Naturally, in a pile of coal this size, spontaneous combustion is an ever-present danger. The pile is carefully patrolled, and whenever signs are found of heating up, the part that is in danger is dug out by the clam, and replaced on another part of the pile. In this way losses are minimized.

Coke Oven Charging

Spanning this immense coal pile are two coal bridges, each with a span of 300 tons. These bridges are for taking the coal from the two piles in their proper proportions, that is 60 per cent. of high volatile and 40 per cent. of low, and delivering to the pulverizer, where the coal is crushed to about the size of a walnut. The coal is handled by belt conveyors, with a capacity of 200 tons per hour, which carry it up to a large circular bin, surmounting the coke ovens, which has a capacity of 2,000 tons. From here it is delivered to the coke ovens, as required.

The Coke Ovens

The coke ovens are arranged in batteries, there being two of fifty-five ovens each, of the Koppers type. One of 25 ovens of the Wilputte type, and there is another battery of 25 Wilputte ovens approaching completion, which will be ready in February for operation. The Koppers ovens have a capacity of about 12½ tons each, and are in use about 20 hours per day, while the Wilputte ovens are a little larger, having a 14-ton capacity, in operation about the same length of time. The red-hot coke is discharged from these ovens into a large truck by an electric ram, which pushes the charge out from the back of the oven. The truck, with its glowing cargo, is run under a tower by a locomotive. In this tower are fitted a series of sprinkler pipes, which pour a fine rain all over the surface, damping it down, but not entirely quenching it. There is enough heat left in the coke to evaporate all the surface moisture on its way to the blast furnace, and when it arrives there, the coke contains only about 4 per cent. moisture. The coke oven reclaiming plant handles approximately 20,000,000 cubic feet of gas per 24 hours. From the crude hydro carbons are extracted benzol, toluol, and xylol, and the tar runs about 7.5 galls. per ton of coal charged. Any surplus gas remaining is used in the soaking pits and reheating furnaces in the mill. Truly, nothing is wasted but the smell, which could well be dispensed with. Those accustomed to living with

COKE OVENS, SHOWING COKE TRUCK

it don't notice it, but it makes itself very free with a stranger.

The Iron Ore Dock

The iron ore dock is a concrete structure, with a present length of 2,040 feet, to which an extension of 300 feet is in course of erection. The dock and ore storage are spanned by three cranes, one of which has a capacity of six tons per trip, and two with a capacity of four tons each. The amount of ore that can be handled by these three cranes is in the neighborhood of 160,000 tons per month. As all ore and coal have to be unloaded during the season of navigation, coal and ore docks are scenes of unremitting activity during the summer. A rail loading dock 400 feet in length is also available in summer.

Blast Furnaces

The blast furnace equipment consists of four furnaces, Nos. 1 and 2 of 8,000 tons capacity each, No. 3 of 12,000 tons and No. 4 of 12,000 tons per month. The charge is delivered on a high level track by electrically operated cars. The two small blast furnaces were part of the original plant, which was built in 1909, the other two having been added since then. The blast furnace air is supplied from two power plants, which will be described later. Gases from these furnaces pass to four gas washers of the sprinkler scrubber type, and then to four centrifugal type washers. There is a gas holder of 40,000 cubic feet capacity. In connection with the blast furnaces there is a battery of Carhall boilers of 3,000 H.P. capacity, operating on blast furnace gas, and the steam generated from these boilers is used to drive four steeple blowing engines. These are built by the Mesta Machine Company, Pittsburgh, and have each a capacity of 14,000 cubic feet free air per minute. Any surplus steam from these boilers is available to help out the mill battery of coal-burning boilers by a direct connection of the main steam lines. There is also in this power house a Rateau Turbo generator of 1,500 K.W. capacity, which is operated chiefly by exhaust steam from the battery of steeple engines.

2,000 H.P. REVERSING, D.C. ROLLING MILL MOTOR

The Open Hearth Furnaces

The open hearth furnaces are in two batteries. No. 1 consists of eight basic lined 50-ton furnaces, and No. 2 of three basic lined 75-ton furnaces. There is an electrically operated 300-ton mixer, to which hot metal from the blast furnaces is delivered, thus ensuring the proper mixture of the metal. There is also a 175-ton mixer in connection with a 20-ton converter vessel, from which the hot metal is delivered to an 150-ton basic lined tilting furnace. This is known as the Duplex plant. There are also 5 cupolas for the speigeleisen, and molten speigel can be transferred to mixers at either the open hearth or duplex plants. The whole of the plant is served by electric cranes running from twenty to one hundred tons. Mention should also be made of the rotary calcining plant, where the limestone and dolomite are treated. This is a rotary cylinder 125 ft. in length, on the same lines as a cement machine.

Power House

Before going on to the blooming and rail mill, it would be well to step aside and see the main power house, the source

of most of the energy utilized in driving the various mills. This is a truly imposing looking department, containing, as it does, probably the largest gas engine outfit in the Dominion. The plant contains four gas engines, each of four cylinders and two blowers, having a capacity of 25,000 c.f. free air per minute, delivvrereed at from 10 to 15 lbs., pressure per square inch. In addition to this are 5 gas engines, direct connected to 1,500 K.W. generators and two Rateau steam turbo blowers of 6,000 cubic feet per minute capacity each. The gas engines are built by the Allis Chalmers Mfg. Co., Milwaukee, and are splendid examples of their type. The cylinders are arranged in tandem, two on each side of the flywheel, and are equipped with electric ignition indicators, which light a lamp at each ignition, thus giving attendant quick indication of any trouble. The distribution is through oil switches, and is all controlled from a pilot house erected above the main floor, and giving a clear view over the whole engine room.

In a separate building is located the pumping outfit, which supplies the whole plant. The total pumping capacity is 57,000,000 galls. per 24 hours, enough to supply a good sized town. It consists of three steam pumps, each of 4,000,000 galls. capacity; three motor driven centrifugal pumps, each of 5,000,000 gallons capacity; 1 steam driven (turbine) centrifugal pump, and one motor driven centrifugal pump, each of 15,000,000 galls. capacity.

Making the Ingots

From the open hearth furnaces the steel is drawn in fifty ton heats, and poured into the ingot molds. These are picked up by a crane and loaded onto trucks running on a narrow gauge rail, and taken to the stripping house. Here are located two 150-ton electric stripping cranes, the action of which is most fascinating to watch. An enormous pair of nippers, like a thumb and forefinger, descend over the mold and grasp it gently, but firmly. A ram comes down and holds the ingot down, while the nippers pull up, and the mold is lifted away from the ingot. Occasionally one proves recalcitrant, and in that case the ingot mold and ingot are placed to one side and dealt with later, after the ingot has cooled a little. There are comparatively few of these, however, and for the most part, the work goes smoothly. After stripping the ingots are weighed, and then proceed to the soaking pit, where heat is furnished by waste gases from the coke ovens. From here they are picked up by another crane and taken to the blooming mill. Of these there are two, a 32-inch and a 35-inch, but the 35-inch is the most used. This mill is a two high, driven by a 4,000 horse power D.C. reversing motor, shown in the illustration. The electric crane deposits the ingot, red hot, on the runway, and away it goes to the first pass, where it is flattened out and lengthened to correspond. Back again, the rolls coming closer together for second pass, and then 2 arms come out from side of runway and turn it over, putting the deep side on edge. This process continues until, instead of an ingot, about seven feet long, we have a bloom about 40 feet long, correspondingly decreased in width and depth. It is then ready to go to the repeating furnace, and a whirling crane picks it from the blooming mill slab, swings it around and shoves it into the reheating furnace. While this is going on, another ingot is on the way through the blooming mill. This mill can handle 50,000 tons ingots per month. Besides the motor there is a steam engine in reserve, twin cylinder 50 in. x 60 in. The motor here referred to was the first reversing motor for steel mill work built on this side, and numberless were the troubles experienced before

CHARGING AND WITHDRAWING CRANE.

OPEN-HEARTH CHARGING FLOOR.

ROLLING MILL, THE ALGOMA STEEL CORPORATION.

the early difficulties were overcome. A comparison of the size of the man in the illustration will give some idea of the dimensions of this piece of apparatus. It was built by the Canadian General Electric Co. The 32-inch mill is two high, driven by a 28 in. x 48 in. twin reversing engine, and can roll 15,000 tons per month. This mill handled all the work in the early days of the company.

The Rail Mill

After the blooms have been reheated in the gas-fired regenerative reheating furnaces, they are removed by the electric charging and drawing crane already mentioned. There are two of these, and our illustration shows one in the act of removing a bloom from the furnace. This crane delivers to the tilting and travelling tables, of which there are three, one connected with each of the two roughing mills, and one to the finishing mill. In order to get the necessary production there must be always three blooms going through the mills, one to each. The roughing and intermediate mills are each three high, 23 in., and the finishing mill three high, 29 in. diameter. The roughing and intermediate rolls are driven by a 36 in. x 65 in. x 48 in. tandem compound condensing engine, and the finishing mill by a 40 in. x 48 in. engine. The tilting and travelling tables are electrically operated, and feed the bloom into the mill, pass it along to the next mill, and then to the finishing roll. The finished rail is carried along a travelling table to a circular saw, where the rail is cut to length, and a test piece cut from each rail, which is marked for number of heat, date, etc. The rail is passed under a hammer, and straightened by lining up with electric light. The size of rail rolled is from 56 lbs. to 100 lbs. per yard, and the mills have a capacity of 30,000 tons per month.

35-IN. BLOOMING MILL.

The finishing rolls deteriorate rapidly, and have to be changed almost daily. These rails have to be gauged very closely and kept to specified size. If too light the inspection will reject them, and if too heavy a considerable loss to the company would ensue. The roll designing department is kept busy checking up templates, and designing rolls.

The Merchant Mills

The merchant mills, as they are called are employed in making of angles, channels, bars, I beams, etc. They comprise an 18-in. mill consisting of four 3 high stands with the necessary travelling tables and hook-up crane and cooling bed. This is driven by a 1,500 H.P. A.C. motor, and has a capacity of 6,000 tons per month. The 12-inch mill contains a 5-3 high stand, driven by a 900 H.P. A.C. motor, 2,500 tons per month capacity. There are four sheer and punch machines for making tie plates, which can turn out 25,000 plates per 12 hours, 1 splice bar shear, 2 notchers, 3 punches, and one hammer, turning out 6,000 splice bars per 12 hours.

Shops and Steam Supply

A battery of steam boilers of 5,000 H.P. burning coke breeze, supplies the steam for the various engines and is connected, as before mentioned, to the blast furnace gas boilers. To keep up with the repairs in the mill, a large engineering department is required—a foundry 100 feet by 250 feet, containing cupola for cast iron, and brass and copper furnaces. A machine, pattern, boiler, forge, and frog and switch shop, employing about 300 men, looks after this end of the mill's activities.

Other Properties

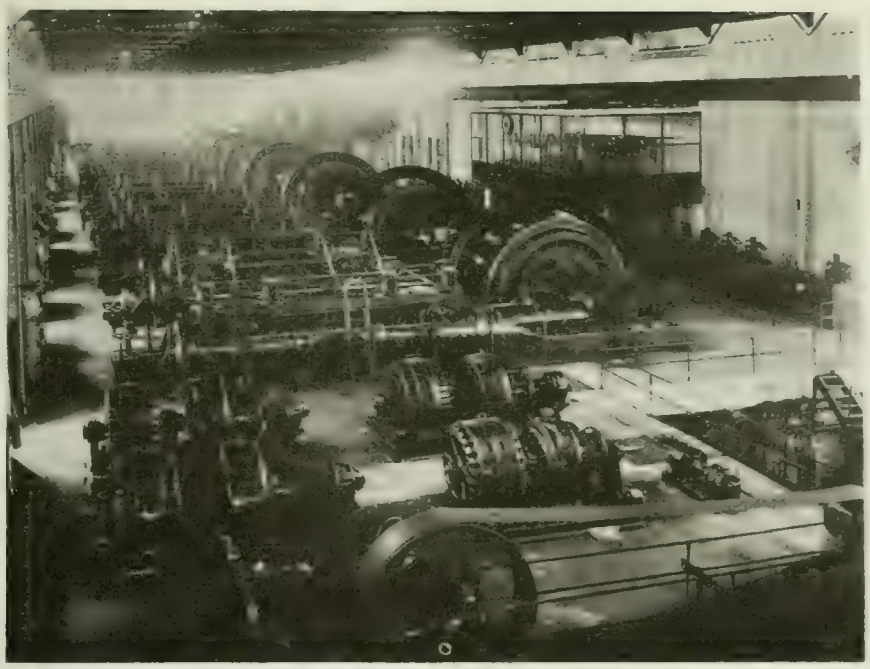
The company is well situated in being almost self supporting in its supply of raw materials. They own and operate the Magpie Mine on the Central Algoma Railway, which supplies about 18,000 tons of low phosphorous ore per month. Another mine, the Helen, has been closed through the exhaustion of the hematite, but there is a deposit of siderite nearby,

containing an estimated quantity of 100,000,000 tons ore. In West Virginia they have a property of 5,000 acres, containing three seams of high grade coking coal, one seam only of which has been opened, yielding 120,000 tons per month. From another property in West Virginia, of 2,100 acres extent, 3,000 tons of Pocahontas coal per month is secured. About 60 miles from the Soo they have large limestone and dolomite deposits, the limestone being 98 per cent calcium carbonate. Besides the power generated from their gas and steam plant the company purchases about 6,000 horse power from the Great Lakes Power Co., and this concern has about as much again available.

Making Better Men

In accordance with the view that better education makes better men, the company have, in conjunction with the Spanish River Pulp & Paper Co., inaugurated night classes for such of their men who are anxious to improve their status. A nominal fee of $1 is charged, which goes to the public schools. The course comprises arithmetic, physics, metallurgy, paper making, and manufacture of coke. The students are put through a preliminary examination, designed to reveal their exact status in educational ability, and after mastering arithmetic as far as involution and evolution, go on to drawing, elementary physics, and any of the before mentioned subjects which suits their needs. There is also a school for foreigners, where they are taught the rudiments of English.

It is a helpful sign when large corporations, such as this, show themselves to be awake to the necessities of the time, and the course they are following should ensure the development of men fitted to ably carry on one of the basic industries of the country.



POWER HOUSE, ALGOMA STEEL CORPORATION.

EFFICIENCY IN BELT DRIVES

By D. Street

In almost every factory and machine shop a certain amount of power is wasted in transmission through driving belts, the percentage of loss depending on the attention paid to the matter. Slipping, the trouble most frequently encountered, is common to all classes of belting, and generally speaking the remedy applied is to cut and tighten, or "take up" the belt so that it will run free from slackness with a better grip of the pulley; but probably more belts are broken and prematurely destroyed in this way than by actual use, not to speak of the additional load thrown on the engine and the consequent waste of power. To overcome slipping, many engineers incline to the principle of using belts wider than is actually necessary. This permits a heavier load to be carried, but when the practice is generally adopted all over a machine shop with fifty or more belt drives, the cost is very considerable. There is, however, a growing tendency to run belts slack, as not only is friction thus reduced and the life of the belt increased, but no power is wasted and the strain on the prime mover is considerably reduced. Immediately the tension is reduced the friction is proportionately lessened. Further increase of the arc of contact round the pulley (after the belt has been sufficiently slackened to have no initial tension) will not lessen the friction, but the load-carrying capacity of the belt is increased. As an example in many engineering shops it has been found that cuts 50 per cent. heavier can be taken on lathes where the arc of contact has been increased from 180 deg. (with a tight belt) to as high as 220 deg. (with a slack belt) and in one instance with a corn-crushing machine the increase in output was over 50 per cent.

To permit of driving belts being run slack a proper belt dressing should be employed. Many belt dressings rely almost entirely on their capacity to "stick," due to the inclusion of rosin or tar in their composition, but others take the form of a non-sticky preservative or belt food free from acid or alkali action, which is absorbed into the belt, rendering it pliable and highly effective, and at the same time protecting it from the effects of moisture, dryness, or chemical fumes. Such a preparation properly applied tends to give belts a velvety cling through the setting up of a vacuum suction between the belt and the pulley face, and will permit of slack running without fear of slip, even under the heaviest loads.

"TURN DOWN YOUR PANTS."

At Coffeyville, Kan., a well-known pastor on a recent rainy Sunday turned up his trousers and trudged to church. Being of an absent-minded nature he forgot to turn them down on arriving at the church. His good wife from the pew noticed the trouble and dropped a note into the collection basket. The pastor took the note, thinking it was a notice, and read aloud:

"Henry, turn down your pants."

GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT.

Making Milling and Gear Cutting Attachment—IV

This Article, the Last of the Series, Describes the Making of the Vise, Which is Part of the Milling and Gear Cutting Attachment

By ROBERT MAWSON

IN this installment of the article the various tools used when machining the vise which is part of the attachment are described.

Some of these tools are so designed that a number of castings can be operated upon at one sitting, care at all times being exercised so that the parts are interchangeable. Other smaller, yet necessary elements are also investigated, and the tooling processes illustrated.

In all the article has been written with the idea of showing how a modern machine shop goes about the problem of producing an article economically, using the best methods to attain the same.

The "Star" milling and gear-cutting attachment, which is manufactured by the Presto Machine Co., Inc., Brooklyn, N.Y., has also, as one of its elements, a vise which is attached to the vertical slide column. This part is useful for surface milling, cutting keyways and milling ends of shafts, etc., the milling cutter being held and driven by the lathe headstock and the piece being machined held in the vise.

Manufacturing the Vise

In Fig. 1 is shown one of the complete assembled vises used with this attachment for the purposes noted.

The first operation on the vise base is milling the jaws, and is shown in Fig. 2. The casting is located and held in a milling machine vise, resting on special jaws as shown to bring the casting in the correct alignment. The vise is then fed against a revolving cutter and the surface A machined. The end of the same cutter is then used to face the two surfaces B, thus making them parallel and at right angles to the first surface milled.

For the next operation the casting is placed in the fixture Fig. 3, being located by means of a tongue which fits inside the cored opening. The piece also rests on pins for height as shown, with other pins at the end for location. After the cover A has been fastened down the three screws B are tightened to hold the casting securely in the fixture.

The sides are then milled, using set blocks at C to obtain the correct width and height. After this has been performed the casting is placed in the fixture Fig. 4, which is essentially a special two-jawed chuck, on the lathe and the surface A faced and turned. It will be seen the casting is held by means of chuck jaws and located by forcing the edge of casting against the surface B. A hole is also bored in the base 1.375 in. diameter to suit the register on the base binder. When machining the vise slide the fixture, Fig. 5, is used for the first operation. This tool is designed to hold four pieces at once, which are dropped in from the top, resting against the lower face and held by means of screws at the rear. The faces A are then machined to the correct depth to suit the vise gibs.

The next operation is machining for the liners, and the fixture used is shown

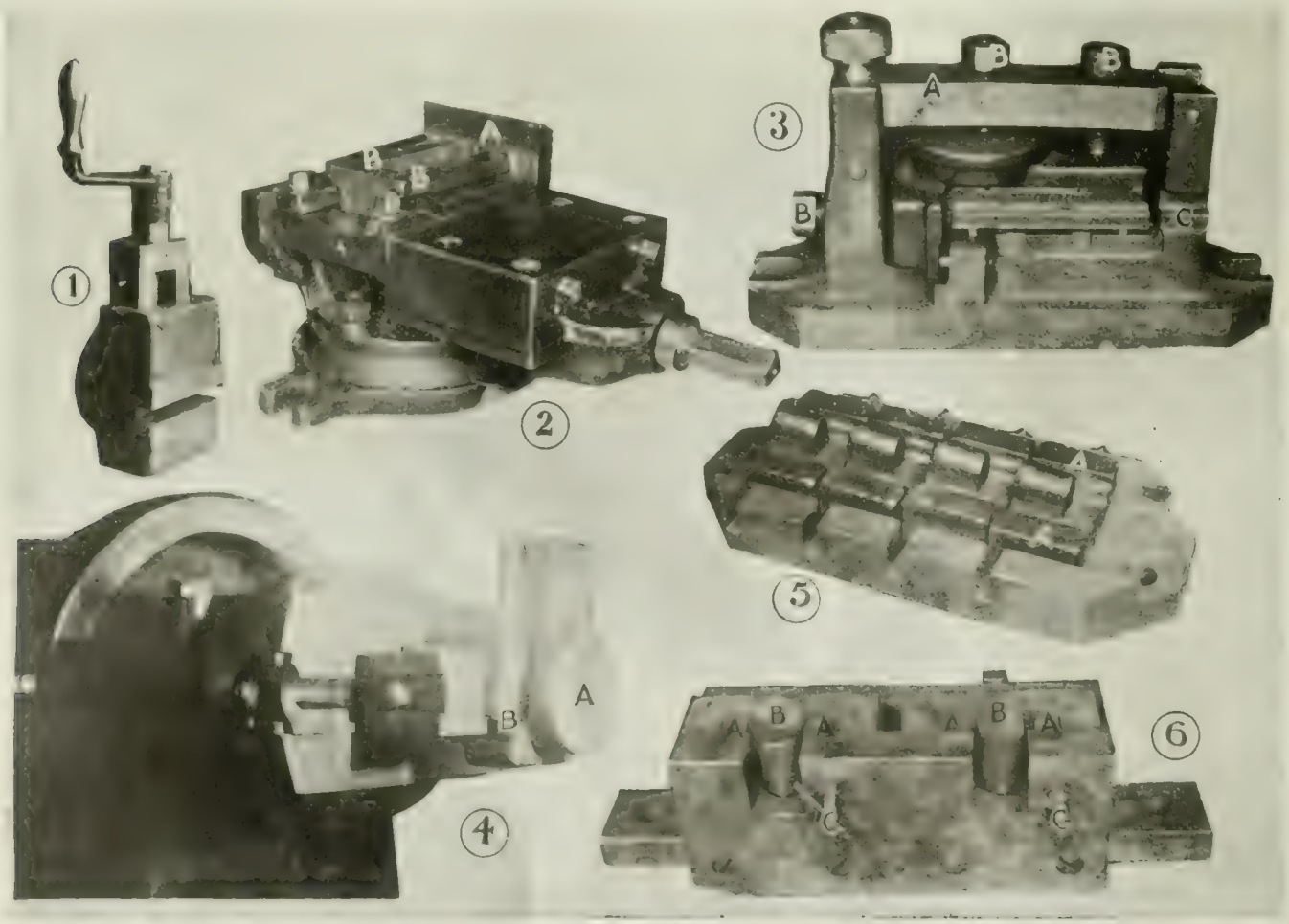


FIG. 1—A COMPLETE VISE. FIG. 2—MACHINING VISE BASE. FIG. 3—MACHINING BASE SIDES. FIG. 4—TURNING AND FACING OPERATOIN. FIG. 5—MILLING THE VISE SIDES. FIG. 6—MILLING FOR THE LINERS.

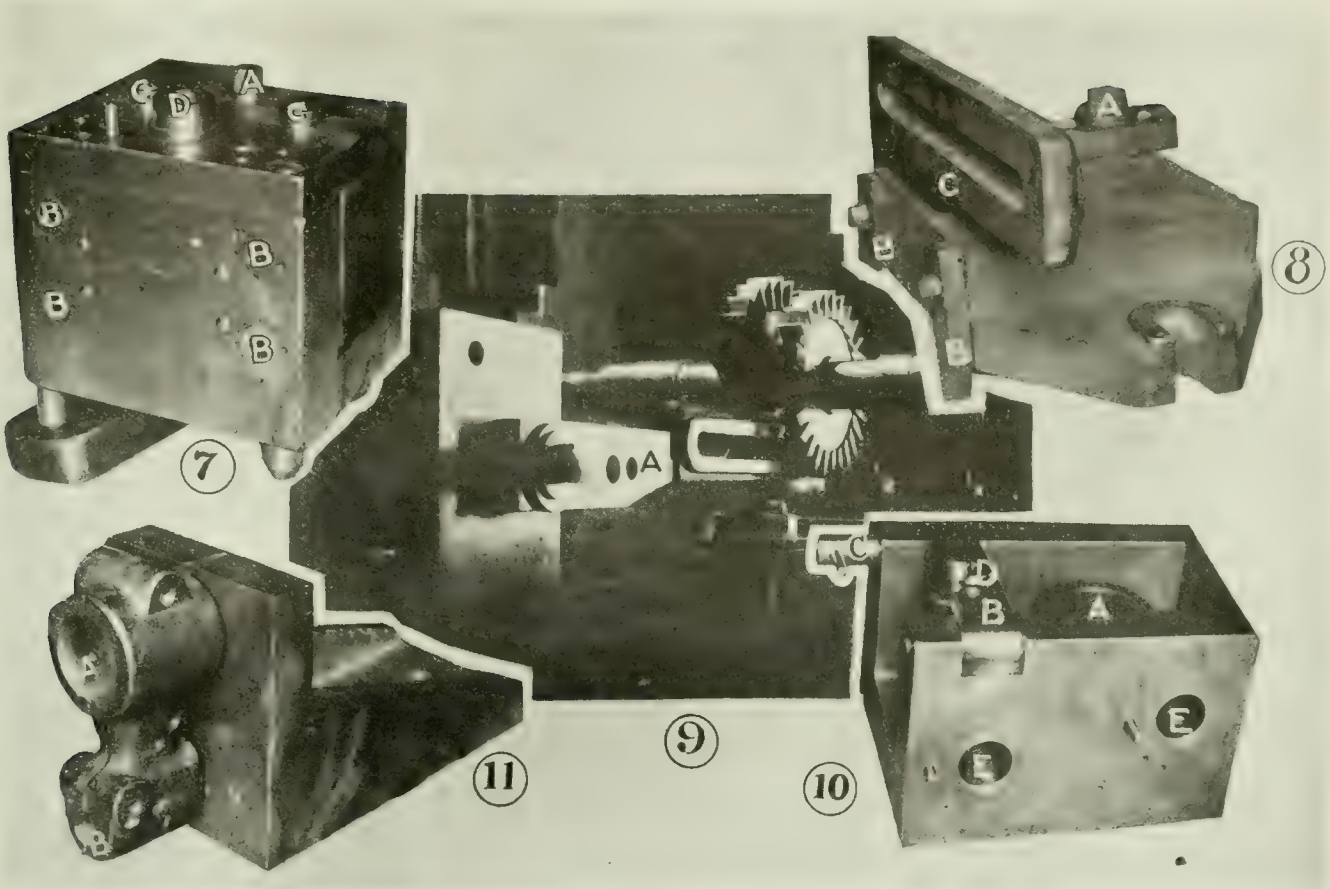


FIG. 7 DRILL FOR VISE SLIDE. FIG. 8 MILLING BASE. FIG. 9—MILLING THE ARM. FIG. 10 DRILL FOR TAIL STOCK. FIG. 11 MACHINING THE SLOTS

in Fig. 6. The castings, two at once, are located by the tongues A, which fit into the grooves machined for the gibs and forced against them with the screws shown at the rear of the fixture; the surface B is then machined to suit the steel jaw liners.

By this method of machining the surfaces milled in this operation will be square with those produced in the previous one. The screws C are utilized to force back the casting after the milling operations, thus affording an easy means to remove the piece should it fit tightly in the fixture. The jig used to drill the various holes in the vise slide is shown in Fig. 7. The casting is located by tongues which fit into the grooves machined for the gibs and held down with the screw A. Four holes are then drilled through the bushings B for the gibs, two at C for 5-16 in. x 18 in. screws, and one at D which is afterwards tapped out to suit the traversing screw of the vise. The rest of the operations on the other elements used on the vise are simple in their nature and need no description.

Machining the Angle Brace

The angle brace is the element which supports the overhanging bar and is adjustable to accommodate various diameters of work being machined. The first operation when machining the brace is milling the base, and the fixture used is shown in Fig. 8.

The casting is fastened on to the fixture by means of the bolt A. The two straps B are swung against the surface C which is pushed back against them. When the face touches both straps the bolt A is tightened to hold the casting in position. By this simple method of locating, the chance of machining too much stock from one end of the base is avoided. The face C is then milled, using the side of the cutter operated in a vertical milling machine. The long boss on the upper side of the base is next machined, the casting being held on the milling machine table, no fixture being necessary.

For the next operation the casting is placed in the fixture, Fig. 9, and located by a plate, against which the machined base is fastened. The strut A is then slid against the end as shown to resist the cutting stresses, a pair of side mills accurately spaced as shown perform the machining operation, both faces being milled at once.

The tailstock is the part of the attachment which is fastened to the overhanging bar and carries a centre on which the carrier is supported when having its plates milled or for similar work.

The first operation when machining this part is boring a 1.375 in. hole, the casting being held in a two-jawed chuck and the work done on a lathe. The casting is then placed in the jig, Fig. 10, being located on the pin A, the other end of the piece is held by two fixed pins. The cover B is then dropped down, being held with the sliding pin C. The screw shown in the cover, when tightened against the casting, forces it against the fixed locating pins. A 0.5625 in. hole is then drilled in the casting through the bushing D and two holes for 5-16 in. x 18 in. tap through slip bushings, which are placed in the fixed bushings at E.

For the last operation the casting is placed on two pins, which fit into the holes, Fig. 11, A and B, and the two slots shown machined using a 1-16 in. thick slitting saw for the work. The rest of the elements used on the milling and gear-cutting attachment are simple lathe or milling operations, for which no special tools are either necessary or advisable.

The tools which have been described and illustrated in this article will give the reader some idea, however, what special equipment is used for manufacturing this product so that intensive and accurate parts may be obtained in a modern, up-to-date machine shop.

Large Car Orders Placed.—Large orders for rolling stock have been recently placed with Canadian car manufacturing companies. The contracts which have been placed were on behalf of the Canadian National Railways by Mr. D. B. Hanna, and are for an aggregate of 2,840 cars of various classes. The contracts have been divided between the Canadian Car & Foundry, the Eastern Car Co., New Glasgow, N.S., and the National Steel Car Co., Hamilton.

MORE THAN 2,000,000 H.P. ELECTRIC ENERGY GENERATED IN CANADA

THAT there is upwards of 2,000,000 horse-power of electrical energy generated in Canada is demonstrated in the report on Electric Generation and Distribution in Canada about to be issued by the Commission of Conservation. The investigation into this subject has extended over a number of years and has been a most comprehensive one. Two of the principal points to bring out are the large part water-power plays in the production of electricity and the fact that over three times as much power is produced by privately-owned plants as by those publicly owned.

Water Power Predominates

There are, according to the report, 565 electric generating plants in Canada, with an aggregate capacity of 2,107,743 h.p. These supply 752 distributing systems, which serve 973 localities. Classified according to the prime-movers used, these plants are divided as follows:

270 hydro-electric, aggregating .... 1,806 618 h.p.
201 steam plants, aggregating .... 288,202 h.p.
49 gas plants (nearly all producer-gas), aggregating .... 8,157 h.p.
45 oil or gasolene engine plants, aggregating ... 4,766 h.p.

These figures give a very fair idea of the power situation, and show the unquestionable predominance of water-power. In the Maritime Provinces, steam and water-power predominate with the former in the ascendancy. In Quebec, Ontario and eastern Manitoba, water-power is the dominating source of power, every large centre and most of the smaller ones being supplied by electricity produced from water-power. In the Middle West, large plants are steam operated, while the smaller ones use internal combustion engines. In British Columbia and western Alberta, water-power again predominates, but the generous coal supply in certain districts also permits considerable steam operation.

In the large hydro-electric installations, the report says, the type of plant is of the most up-to-date and substantial construction, but the same, unfortunately, cannot be said of many of the small plants, particularly the older ones. Old, leaky dams and inefficient types of water-wheels in bad repair are often the real causes of shut-downs attributed to lack of water. Likewise in the large steam plants, efficiency is shown, but this is not generally true of the smaller ones. For the prairie provinces, where fuel and the cost of generation are high in price, the report suggests that it would be more economical to generate electric power in large central steam plants and distribute it over transmission lines.

More Privately-Owned Plants

The report shows that there are 207 municipal or publicly-owned plants of 452,508 h.p. capacity and 358 plants privately owned with a capacity of 1,655,235 h.p. The Niagara system of the Ontario Hydro-Electric Power Commission is the largest under public ownership. It has a load of over 201,000 h.p., supplies 120 municipal distributing systems and serves an area of 210 miles long by 85 wide. The largest privately-owned system is the Shawinigan in Quebec, with a load of 205,000 h.p. supplying 76 distribution systems and serving a triangular area with a base of 140 miles and a height of 75 miles.

The largest hydro-electric development is 488,800 h.p., in the three large power plants at Niagara. The large installations are not all confined to this site, however, as there are, in addition, 5 plants of over 100,000 h.p. and 36 plants of over 10,000 h.p. capacity. The large single plant is the Ontario Power Co., now operated by the Ontario Hydro-Electric Power Commission at Niagara, with a total capacity of 211,300 h.p. The largest single unit thus far installed in Canada is 20,000 h.p., at Grandmere, Que., though the Ontario Hydro-Electric Chippawa plant will contain units of 50,000 h.p., while future plans contemplate the use of 100,000 h.p. units.

The average head of water utilized is not exceedingly high, but many large hydro-electric plants operate under fairly high heads, such as 140 to 180 ft. at Niagara, 145 ft. at Shawinigan, 83 ft. at Grandmere and 400 ft. at the Coquitlam-Buntzen plants near Vancouver. The highest head in eastern Canada is 540 ft., at the 8,000 h.p. plant at Eugenia Falls, Ont., while, in the West, a head of 1,820 ft. is utilized at Britannia Beach, B.C., where the development also provides a total head of 3,530 ft. in two steps of 7,450 ft. and 2,080 ft. for the direct operation of other machinery. On the other hand, one of the largest plants recently installed at Cedars, Que., operates under a head of 30 feet.

The 26,667-horse-power plant at Hamilton, Ont., is the largest steam-power plant in Canada and is used as an auxiliary. The 14,234-h.p. plant at Edmonton, Alta., is the largest steam plant operated continuously.

Storage Reservoirs Increasing

No less than 59 plants report the successful operation of storage facilities to provide for increased flow at low-water periods. Among Government undertakings of this nature may be mentioned the three large reservoirs at lakes Timiskaming, Kipawa and Quinze to regulate the flow of the Ottawa river; La Loutre reservoir on the St. Maurice river; lake St. Francis dam for the St. Francis river, Que.; the extensive system of small conservation reservoirs on the Trent river, Ont.; lake Minnewanka, on the upper waters of Bow river, Alta., and the reservoirs on Jordan river and Goldstream, near Vancouver, B.C. Most satisfactory results have been obtained from storage undertakings, the capacity of plants being frequently doubled or more than doubled.

The utilization of the large peat areas in the north part of Jutland is receiving much attention. The area is said to be as much as 28,000 acres, which, according to "Ingenioren," could be completely drained by gravitation, and the total contents might be equivalent to 23 million tons of coal. It is suggested that the peat could be utilized (1) as air-dried briquettes used for heating the boilers of adjacent electrical supply works; (2) as machine made briquettes sold for general consumption as far away as the cost of transport will allow; (3) as peat litter to be sold to neighboring farmers; (4) the lower parts of the bogs should be reclaimed and used for agriculture. The heating value of the peat is assumed to be half that of coal The works required should be executed by private enterprise, aided by the State, and the cost of reclamation would amount to £50,000. The first 9,000 acres could be dealt with in twenty years, and the rest of the land occupied in course of time as the peat is cleared away.

ELECTRIC PLANTS IN CANADA, SHOWING CAPACITY, OWNERSHIP AND PRIME MOVERS

Province	Plants		Ownership. Private.		Public		Kind of Prime Mover. Hydraulic.		Steam.		Int. Combustion.	
	Number	Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.	No. of Plants	Total Capacity h. p.
Nova Scotia	[illegible]	27,177	24	23,064	14	4,113	12	3,474	23	23,478	3	225
Prince Edward Island	[illegible]	1,314	9	. . .	. . .	. . .	5	207	2	475	2	632
New Brunswick	[illegible]	18,607	16	16,212	7	2,395	8	7,463	12	10,014	3	1,130
Quebec	119	625,061	99	604,903	20	20,158	92	585,911	20	38,791	7	359
Ontario	[illegible]	[illegible]	105	609,658	68	290,198	113	831,004	50	66,519	10	2,333
Manitoba	[illegible]	103,03[illegible]	[illegible]	54,706	15	49,309	4	78,550	13	23,841	6	624
Saskatchewan	[illegible]	30,29[illegible]	26	2,682	36	27,911	. .	. . . . .	15	26,585	47	4,008
Alberta	[illegible]	85,217	27	43,235	25	41,882	4	31,980	12	51,805	6	1,332
British Columbia	68	306,776	41	290,234	22	16,542	1	10,000	2	227	...	2,280
Yukon	3	10,227	3	10,227		. . . .	31	258,029	22	46,467	10	. . . . .
Canada	565	2,107,743	358	1,655,235	207	452,508	270	1,806,618	201	288,202	94	12,923

The Disabled Soldier and the Mechanical Trades

The Country's Responsibility Does Not End With a Pension, But Begins Where in Former Wars it Stopped—Vocational Training and a Keen Interest in His Welfare Are Necessary

By DOUGLAS C. McMURTRIE

Director Red Cross Institute For Disabled Men, New York

IN the past, our method of dealing with men permanently disabled in the course of employment has been to pay the worker a pension in the form of compensation and forget him and his injury. But the cost of disability to the machine industry has not been alone in premiums paid for casualty insurance. There has been the cost involved in training experience, and adaptation of a skilled worker who does not return to his job, and the fitting of a newcomer to take his place.

There are three means of reducing and approaching the complete elimination of the cost of disability: first, accident prevention; second, thorough medical attention to minimize the disability resulting from the injury; and third, salvage of the remaining abilities of the worker through rehabilitation for self-support. The first of these has already received wide attention from employers and has wisely been encouraged in a financial way by casualty insurance companies and state funds. The values of the two latter have, however, not as yet been appreciated. Their energetic application would effect a tremendous saving to industry.

Many injuries from which men would completely recover in a short time under adequate and high grade medical attention are treated for an insufficient time, or by incompetent physicians, and, instead of a prompt return to work, the case at best drags along over an extended period and at worst becomes chronic or develops into permanent disability. Some States require the insurance carrier to provide but two weeks of compulsory free medical attention to the injured man. For the insurance company to take advantage of this limitation is the most short-sighted policy possible, because for every dollar saved in physicians' or hospital fees the insurance carrier pays out later $10 in compensation. And what the insurance company pays is actually paid by the insuring employers in their regular premiums.

Unlimited medical attention of the highest grade should be an axiom of casualty practice. It should be insisted upon by employer and workman alike. The best outcome of any injury is to have the employee return to his job as a well man in the shortest possible time. It is well to develop a science of dealing with cripples, but the ideal is to have fewer and fewer cripples with which to deal.

The third method of attack on the cost of disability is rehabilitation for self-support—the re-education of an injured man for an occupation which he can follow, or a process which he can perform, in spite of his handicap. The science of rehabilitation is new, and the experience in it has practically all been gained in the effort to make sound and just provision for the disabled soldier or sailor Every country among the recent belligerents is to-day operating a comprehensive system of re-education for disabled soldiers, and is placing upon that system more dependence than upon the pension system.

Paying a man a small monthly or weekly stipend on which he is expected to live in idleness is not a very constructive method. With the breakdown of confidence in the pension system it was realized that the only real compensation for disablement was restoration of capacity for self-support. It was further realized that very few jobs require all the physical faculties and that in the present-day variety of industrial processes it is possible to find a job in which a man with a given type of disability can function 100 per cent. efficient. Some jobs are standing, some seated, others require walking about, some jobs at a bench working on small articles require but little strength, others involve great physical exertion. Still others do not require the sense of hearing, in others the sense of sight is not essential. Finding the future work of the disabled men, therefore, requires expert and painstaking choice, but a successful selection is possible even for the seriously handicapped. The first aim is to place the man back in a different job in his own trade or in a trade closely related. In such a job his past experience will stand him in good stead. Failing this he can be retrained for a different line.

The process of re-training the disabled is known as re-education, and can best be provided in a special school for crippled men. The first school of this kind in the United States is the Red Cross Institute for Crippled and Disabled Men, established in New York City through the generosity of Jeremiah Millbank. At this school, opened to disabled civilians and soldiers alike, six trades are already being taught: artificial limb making, motion picture operating, oxy-acetylene welding, printing, jewelry work, and mechanical drafting. More will be added as the demand develops. Graduates are already giving satisfaction in the jobs to which they have been graduated, so the enterprise has passed the experimental stage. And in the results attained with disabled soldiers abroad there is overwhelming evidence of the logic and practicability of rehabilitation.

The cost of soldier rehabilitation is being met by the United States Government and by the Governments of some of our allies. It will be admitted without argument as desirable that the advantages of re-education be made available to disabled civilians as well, but will not the cost be prohibitive? The fact is that rehabilitation effects a reduction rather than an increase in the cost of disability to industry or to the community as a whole.

A typical case will illustrate how the saving is effected. A worker in Massachusetts was injured by a fall while working inside a submarine and his hand became permanently crippled. In due course his compensation rate was determined and he was referred to the insurance carrier to be paid $10 a week for a long period, with a maximum total payment of four thousand dollars. Since the disability was manifestly permanent the insurance company wrote the case off their books as a four thousand dollar loss and transferred that amount to reserve to cover the weekly payments. After the compensation had been paid for nearly a year, a new official of the insurance company began looking over the list of men to whom the company was paying compensation. His attention was directed to the man in question, and the latter was requested to call at the office of the company. The case was like many thousands of others susceptible of rehabilitation for self support, so the insurance company official put a proposition to the man in very frank terms. "I believe that you can be trained to earn a good living. I want you to understand very clearly, however, that this proposal is to the financial advantage of the company, but I also believe it is to your advantage as well. A total income of ten dollars a week is not very attractive to you, and you would probably rather return to work at a good wage than remain idle. If you will consent, the company will send you to a school of re-education and see if we cannot get you back on your feet in good shape."

The injured man consented to the proposal and the company sent him to the Red Cross Institute in New York. They began to pay him not ten dollars a week as required by law, but forty dollars a week; twenty to him in New York and twenty to his wife at home. The company also paid liberally his travelling expenses in both directions. In the period of eight weeks he was re-educated in oxy-acetylene cutting and welding, and returned home. He is now making, not only a satisfactory wage, but twice as

much as he had ever earned before the accident took place.

In the whole transaction every party at interest was benefited. The man was advantaged in that his general living standard was distinctly raised, and the necessity of working for his living could not be considered a hardship. The company paid less than five hundred dollars for his rehabilitation, and this expense, in conjunction with the five hundred already paid in weekly compensation during the first year of idleness made a total for the case of one thousand dollars. They were thus enabled to charge three thousand dollars of profit to the account of profit and loss. The community was infinitely the gainer in that the man formerly an unproductive consumer, became a useful producer instead. The community further gained in the elimination of the disabled man from the category of a prospective dependent because, while compensation might have taken care of him in a very insufficient way during the period of idleness, there would have come a time when compensation ceased, and then he would have been in a desperate economic status indeed—confirmed in habits of idleness, untrained for skilled work, and without any source of support.

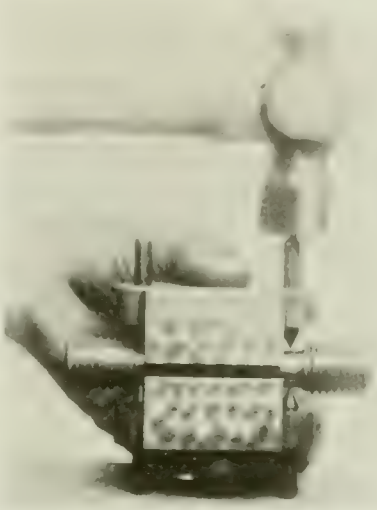
A more intelligent handling of disability by insurance carriers will, therefore, reduce their expense, and will thus cut the cost of casualty protection to the employer. There is needed also, however, some revision of compensation laws so that there may be definite encouragement to insurance carriers to offer opportunity of rehabilitation and definite encouragement to the disabled men to take advantage of it. Practically every compensation case that has ever come to the Red Cross Institute has come on the day his compensation expired. For one year, for two years, or for four years the man has existed in idleness, drawing compensation and cultivating habits of indolence. When his support was cut off he then became interested in rehabilitation. Present compensation legislation tends to encourage the man to remain idle because his payments are reduced by any improvement in earning capacity. A revision of this practice will make for more constructive provision.

In short, the first effort should be to prevent injury, the second to minimize its permanent effects, the third—when disability has ensued—to offset its economic consequences. The execution of this complete programme is not only sound humanitarian practice—it is good business as well.

DIAL EXTENSOMETER AND SPECIMEN-MARKING BLOCK

By F. C. P.

The accompanying illustrations, Figs. 1 and 2 show the dial extensometer and specimen-marking block, developed by the Riehle Bros.' Testing Machine Co., at Philadelphia, Pa. It is pointed out that with the use of these instruments a specimen can be quickly and accurately marked and the elastic limit seen as the hand travels around the dial. The extensometer meets the demands for a simple, compact, rigid, direct-reading and accurate instrument. The marking block is made in two pieces which are brought in alignment by two dowel pins. The specimen is placed as



MARKING BLOCK USED WITH EXTENSOMETER

shown, and holding block in fingers the ends of two punches are set on a solid block while the opposite punches are hit with a hammer. The specimen is marked on an exact diameter the correct distance apart and very quickly.

It will be noted that the clip above the top frame is for the thumb and the hole under the same frame for the forefinger. When the extensometer is gripped as noted in Fig. 1, the thumbscrews are brought just the right distance apart to fit in the holes which have been made by the marking block as explained above. This is found very convenient besides allowing for rapid work.

There is the provision made for measuring the average stretch. The lower thumbscrews operate in a frame which swivels about a centre in the same plane as the screws but whose axis is perpendicular to the common axis of the screws. Thus, if one side of specimen elongates more than the other the lower frame will swing accordingly and its centre will have a moment which is the average elongation between the two sides. This adds much to the accuracy of the instrument.

There is also the provision for adjusting the instrument if it becomes inaccurate. If for any reason it is thought the extensometer is giving faulty readings, a suitably arranged micrometer attachment can take the place of a test specimen and the dial readings can be checked against the movement of the micrometer screw. The dial is held in a cup which is fastened to the strut by screws. The cup can be adjusted up or down until the readings correspond to those of the micrometer screw.

Rumored Change in Board.—There is talk of some changes in the board of the Canadian Car and Foundry Company after the annual meeting takes place. With the retirement of Hon. N. Curry from the president's chair, to become chairman of the Board of Directors, a new president will have to be appointed, the first change of this kind since the inauguration of the company. It is generally thought that W. W. Butler will be the man chosen. It is understood that J. Frater Taylor, chairman of the board of the Lake Superior Corporation, will join the board of the Canadian Car and Foundry Co.

EXTENSOMETER BEING PLACED IN POSITION ON TEST PIECE.

Some Pointers on Rail Mill Practice

An Analysis of Modern Methods With Particular Reference to Roll Designing and Shrinkage Problems—Experimental Data—Designing the Rail Mill Passes—Edging Pass Work Varies

By W. S. STANDIFORD

THE manufactured steel rails have reached a high grade of perfection, due to the fact that the producers have availed themselves of every advantage that science and research could afford, and railroad engineers have learned from experience the qualities that are most desirable under modern traffic conditions. Perfection, however, has by no means been reached, and the long reach of rail breakages each winter gives an approximate measure of the importance of the problems that are yet to be solved. In view of these conditions it is desirable to make a critical analysis of prevailing rail mill practice and roll designing methods as a basis for future progress; such an analysis is attempted in this article.

Particular stress is laid on rolling practice, the melting problems being less complicated; much of the writer's data is drawn from the Ohio Works at Youngstown, Ohio, operated by the Carnegie Steel Co. The ingot is bloomed at the Ohio Works on a 34-inch two-high mill, driven by a pair of 45 x 72 inch reversing engines with a hydraulic reversing gear. The top roll is carried by counter weights and is raised and lowered with a hydraulic screwdown; the blooming mills are steel and have a 2½-inch hole in the centre for the introduction of cooling water. These rolls are 57½ inches long with 18½ inch necks, and have three grooves, 18½ inch, 9½ inch, and 7½ inch; the ingot, which is 22 x 18 inches, is reduced to a bloom 7½ x 8 inches in 13 passes, as shown in the accompanying table:

Pass No.	Draft. Inches.	Groove No.	Size when leaving Pass. Inches.
1	2½	1	18 x 19½
2	2	1	18 x 17½
3	2⅛	1 edge	17½ x 15⅞
4	2⅛	1	17½ x 13¾
5	2⅛	1	17½ x 11⅝
6	2⅛	1	17½ x 9½
7	2¼	2	9½ x 15¼
8	2¼	2	9½ x 13½
9	2¼	2	9½ x 11½
10	2¼	2	9½ x 9½
11	1	2 edge	9½ x 8½
12	1	2	9½ x 7½
13	1¼	3	7½ x 8

It will be noticed that the drafts are heaviest in the first passes, getting lighter towards the last pass. Some rollers think that this distribution of the draft causes the steel to open up and crack more than if the drafts were light at first and heavier toward the last of the blooming, basing their opinion on the fact that the ingots have no fibre and are more or less honey-combed, in which state they do not hold together as well as after work has been done on them and their structure is fibrous and more compact.

Experiments at South Chicago

Considerable experimenting has been done at South Chicago to determine what distribution of drafts gave the best results. The ingot used in the South Chicago mill is 16¾ x 18½ inches, and is reduced to a 7¾ x 8½ inch bloom in nine passes. The blooming mill is a three-high mill, so that each change in draft arrangement could only be accomplished by making new rolls, whereas, on a two-high mill, the drafts can be exchanged with no expense by simply varying the distance the top roll is raised or lowered.

After considerable experimenting, the South Chicago officials decided on the drafts they use at present, which reduced the percentage of seconds enough to more than repay them for the expense of the investigation. The following table shows the original distribution of drafts and that decided on by the experiments:

Pass No.	Original Draft Inches.	Present Draft Inches.
1	3 1/16	1¾
2	2 1/16	1 15/16
3	2 11/16	1¾
4	2 1/16	1⅞
5	2 11/16	3⅛
6	2⅛	2 3/16
7	2⅛	3 5/16
8	1⅞	2 1/16
9	1 11/16	2 3/16
Total	20⅜	20⅜

The design of the passes in blooming mill rolls is not such a difficult matter in a two-high as in a three-high mill, because in the former it is impossible to give the passes much shape, while in a three-high mill, the piece goes through each pass but once, and the pass can be shaped to the best advantage. In all square passes, such as blooming mill passes, it is the aim to get as much side work on the piece as possible, to counteract the tendency of the steel to shear. The latter is due to there being greater elongation on the top and bottom of the piece caused by the up and down work, than on the sides where there is much less work. It is impossible to get the elongation equal on all sides because it is impossible to have the work equal on all sides of a rectangular bar, except in a universal mill, but that condition can be more easily reached in a three-high than a two-high blooming mill.

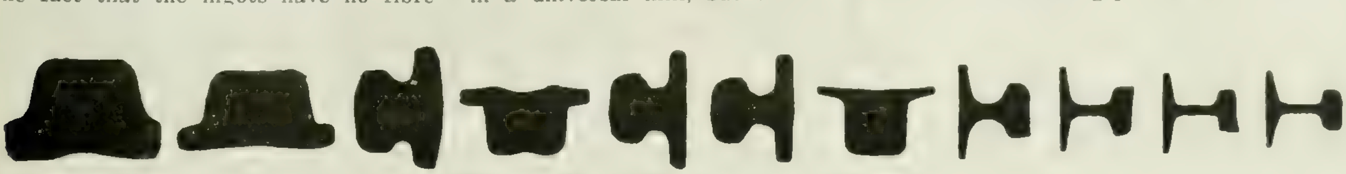
This shearing tendency, due to unequal elongation, besides being greater in a two-high than in a three-high mill, is not counteracted as much in the succeeding passes. In a two-high mill the piece goes back and forth two or four times before it is edged up and work done on the opposite sides, while in a three-mill the piece has work done on the opposite side in each alternate pass which tends to remedy the harm done by the unequal elongation.

The best that can be done, then, in designing passes for two-high rolls is to make the radii large and have taper on the collars, so that when the piece does fill the pass there will be work done on the corners and part way on the sides, which will help to heal up the cracks. Aside from providing suitable radii in the corners of the passes and making the passes of the proper width to suit the drafts decided upon, there is little else to be observed in laying out the blooming mill passes, except the swell in the bottom of the grooves. This swell is put in the bottom of the pass to reduce the thickness more in the centre than at the edge, so that when the piece is edged up in the following pass it will have room to spread without overfilling the pass, causing a seam that would carry through to the finished rail. The amount of swell depends on the amount of spread the piece will have in the different passes, which is a variable quantity, depending on the composition of the steel and the temperature at which it is rolled. The bloom coming from the mill is from 30 to 40 feet long, depending upon the length the ingot was poured, which is governed by the section of rail to be rolled.

This long bloom on its way to the rail mill passes between the knives of the bloom shears, where the front end is lopped off back to the solid steel and then sheared into blooms of suitable length to make two or three rails, depending on the section to be enrolled.

Designing the Rail Mill Passes

The first six passes at the Ohio Works are called the roughing passes and the last five the finishing passes. The finishing passes are laid out first, using the finished rail section from starting point and working back through the other finishing passes, which will be dif-



OHIO WORKS PATTERN OF RAIL ROLLS.

ferent for each different section of rail.

The roughing passes are designed to suit the size of bloom to be used, and provision must be made to have them so constructed that different sections of rail can be made without changing the roughing rolls for each change in section. The most important thing in designing the finishing passes is to have the work equal in the head, web and flange; that is, to have the percentage of reduction as nearly equal as possible in the three parts of the rail. Every effort is made to do this, but certain requirements must be met, which makes this impossible to carry this out to the letter.

To get the exact area of the finishing or the last pass, the following calculation was made. The specific gravity of steel, as given by good authority, is 7.854, which figure has been confirmed by experiments made with bessemer steel at Joliet, Ill.

Weight per cubic inch = sp. gr. × 0.036085-Kent, pg. 163, hence weight per cubic inch = 7.854 × 0.2832 pound.

A bar of steel 1 square inch in cross section and one yard long would weigh 36 × 0.2832, or 10.195 pounds; therefore, a rail weighing 70 pounds per yard would contain 70 ÷ 10.195 = 6,863 square inches. The rail will have a greater area hot than cold. It is assumed that the steel at the temperature at which the rail is finished, has an expansion of 3-16 inch per foot at least. In all rail mills hot templates are laid out with a shrink scale having this amount of shrinkage per foot and the finished rail is of the correct weight.

Now, if in a foot the shrinkage is 3-16 inch, equivalent in decimals to 0.1874 inch, to produce a cold bar 1 foot long we must shear the hot bar to a length of 1.01575 feet. Likewise a bar 1 inch square cold will be 1.01575 inches square hot, and will have an area of 1.031 square inches. Since the area of the 70-pound rail given above is 6.863 square inches cold, the hot section will have an area of 6.863 × 1.031, or 7.075 square inches. The finishing pass was accordingly laid out to A.S.C.E. dimensions with a shrink rule having a shrinkage of 0.1875 inch per foot. This was done very accurately with fine lines on bristol board and they are gone over very carefully with a planimeter, which gave the area 6.99 inches, showing a difference of only 0.08 square inch from that called for by the above calculations; in other words, the 70 pound A. S. C. E. rail is a trifle less than 70 pounds.

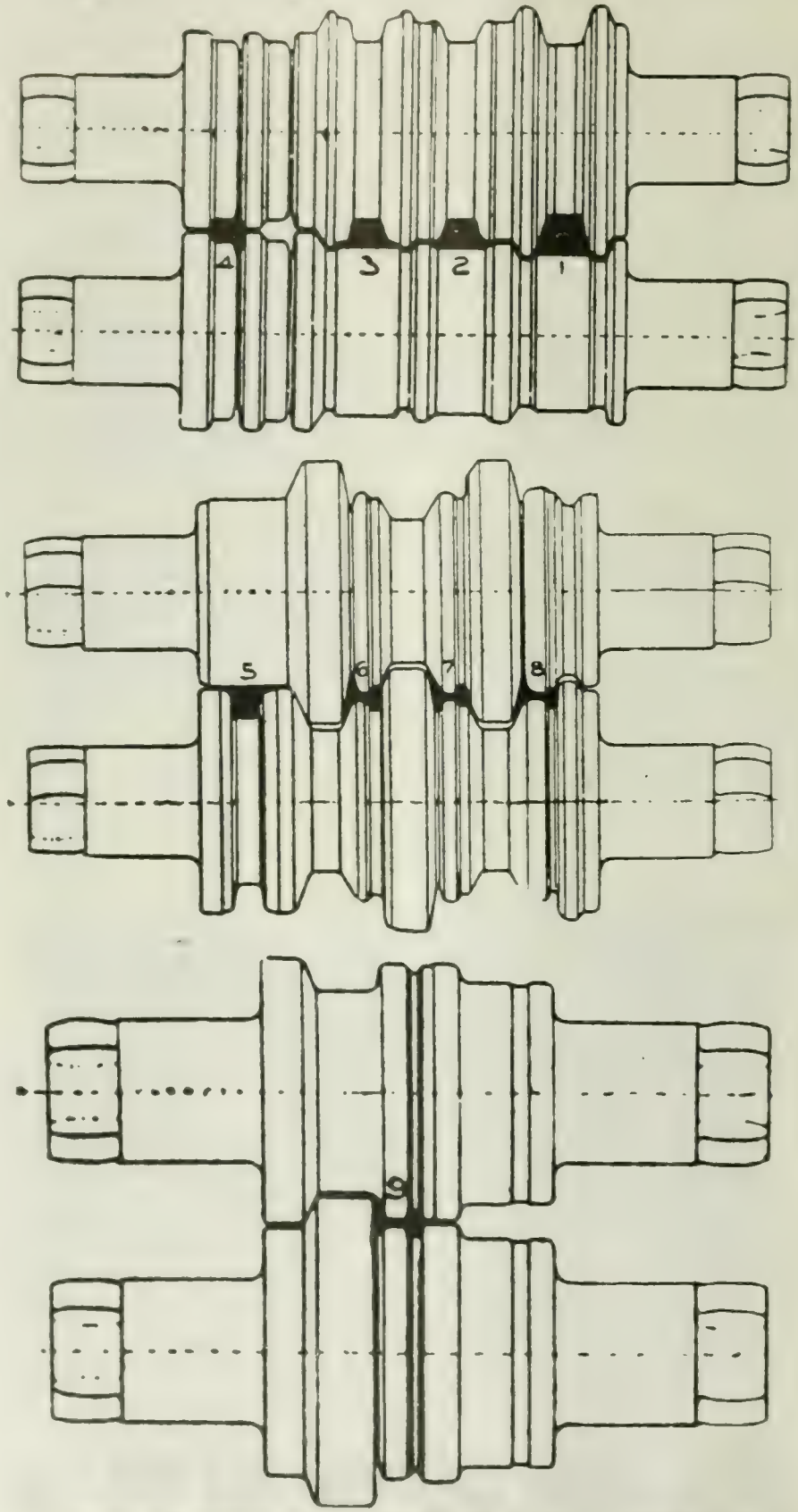
The other sections also show slight variations. This, then, is the design of the finishing or No. 2 pass, except that the flange in the closed roll is opened up 1-64 inch from a point ½ below the centre line, which, besides allowing the rail to deliver free, makes the base of the rail a trifle concave, which is desirable. It guards against a convex base, a serious defect in a rail. Careful work with the planimeter showed that the 6.99 square inches of area were distributed as follows:

	Square Inches
Head	2.92
Web	[illegible]
Flange	[illegible]

or in percentage:

	Per Cent.
Head	41.77
Web	21.16
Flange	[illegible]

It has been the aim in the remainder of the finishing passes to keep the distribution of area as close to the percentage of the finished rail as possible after meeting other requirements demanded in the design. How successfully this has been done will be seen by re-



STANDARD PATTERN OF RAIL ROLLS. NO. 9 BEING FINISHING PASS.

ferring to the table showing the drafts in each pass.

There has been a trifle more work on the head than on the flange in each case, because the flange cools quicker than the head and is therefore harder to reduce. If this fact were disregarded the piece would have a tendency to deliver crooked.

Pass No. 10, called "the leader," is constructed to bring the piece as near to the shape and size of the finished rail as possible. As designed, it requires a reduction of only 3.59 per cent. to make the finished rail. The height is made 1-16 inch less than the finisher to allow for spread. The closed flange is made the same length as the finisher, so that the same angle makes it thin enough to go to the bottom of the closed flange in No. 2 pass, and the additional length will insure the work being done on it, filling the corners and giving the desired width. The fillets on head and flange are made 1-32 inch greater than on finisher, to give a little work at these points in working out the ¼ inch fillets to hold the piece in place. The head is longer on both sides than No. 2 pass to give enough to fill out the crown to 12 inch radius and fill under the head to give a tight fit on the splice bar.

The fillets are made larger than in the leader to give work at these four points, which steadies the piece in the pass. The head is made wider, 1-16 inch on the closed side and ⅛ inch on the open, to allow enough up and down work to force the steel to fill the head, which would not do otherwise, because it is necessary to carry a great deal more stock in the head from No. 8 than is needed. This makes the head thick and keeps it from entering the groove readily. The web is made thin enough to give the portion of work necessary to keep the percentage as near that required as possible, but on account of the large diameter of the rolls at this point the up and down work should not be great.

No. 8, called the first edger, is a very important pass, for, unless it is designed so that it will fill properly, the following passes will not work as designed. The height is made 3-32 inch less than No. 9 to allow for spread. The closed flange is made 1-32 inch shorter than the long flange of No. 9, from the edge of the web, to allow for its lengthening a trifle. The open flange is made 9-16 inch longer from the side of the web and the angle of the flange is made a little greater than No. 9 so that the flange will be thin enough to go home in the closed flange of the second edger. If successful in this, there is not much danger of a narrow flange, for most causes of narrow flanges come from the failure to bottom in the closed flange in this and the following passes.

There is little more than a ½ inch up and down work on the head, which will keep the metal from pulling away from the head, which it is very likely to do, as there is much heavy work on the web. For this reason the fillets on head and flange are made larger. The corners of the head are well rounded to keep the steel from overfilling in the open roll, which would cause a fin. In this, as in all the edging passes, the flange is turned a trifle from the line perpendicular to the centre line, flaring out from the closed roll flange. This is done so that the piece will deliver freely from the pass without wearing the rolls excessively.

In the second edger and finisher, where it is more important that the rolls hold their shape, the head is also turned from the perpendicular. The rolls wear much less when this is done, and because of the taper they can be brought to the correct height with less dressing when they do become worn.

No. 7 is called the finishing dummy. It is the first of the finishing passes and is called a dummy pass because it does not assist much in shaping the rail nor does it reduce the area except by a small percentage. This pass is used to squab the piece down to the proper height to permit the spread in the following passes. Its most important function, however, is to make the flange thin. The longer flange coming from No. 6 is 11-16 inch thick at the point, while the same flange is only ¼ inch coming from the dummy, so it is seen that the flange is made much thinner and consequently longer in this pass.

It is to be noted that one flange is longer and thinner than the other. The longer flange is the one that goes into the closed roll of No. 8 and must bottom in that pass, or loss of width of flange would result, which defect would carry right through the balance of the finishing passes. The width of the head is made just enough greater than No. 8 to give the amount of up and down work desired, and the corners are well rounded to prevent overfilling in the succeeding passes, which would cause a fin. The top of this pass is made V-shaped to help force the metal out of the flange. As the rolls wear, the top roll must be lowered or the flanges will become too thick to enter the closed roll in No. 8. Frequently the top roll of the dummy is made a chill roll, so that the wear will not be so great. This then completes the design of the finishing passes.

The light and heavy sections cannot be made from the same roughing passes as there is such a difference in the amount of stock required to make the different sections. Sections from 50 to 70 pounds are made with the same roughing passes, and sections from 70 to 90 pounds are made on another set of passes. For all sections, the first four roughing passes remain the same, the change from the light to the heavy sections requiring a change in the last two roughing passes.

While the design of the roughing passes is not so particular as that of the finishing passes, there are a number of precautions to be observed or the passes will not work properly. The biggest difficulty in these passes is to get the reduction and shape the rail without making the flange too narrow.

In all the finishing passes the work that is done in shaping the rail tends to make the flange narrow, so that it is necessary to have the flange coming from the roughing passes wider than is required in the finish rail. To accomplish this, different style passes are alternated in such a maner that the edging passes, which do so much toward shaping the rail and thereby making the flange narrow, are followed by squabbing or dummy passes that do little or nothing toward shaping the rail but keep the height down and roll out the flange, making it thinner.

Passes Nos. 1 and 2 are box passes, and in both the reduction is heavy. These passes make the piece narrower in the head and shorter in height. The up and down work necessary to reduce the height causes the piece to spread and begin to form the flange, which effect is

TABLE SHOWING AREA AND REDUCTION OF RAIL IN VARIOUS PASSES

Pass.	Area, Square Inches.	Reduction, Per Cent.	Head. Area	Head. %	Web. Area	Web. %	Flange Area	Flange %
1	46.32	22.8						
2	36.63	20.92	5.14	43.34	2.48	20.91	4.24	35.75
3	29.58	16.05						
4	23.23	21.5	3.75	41.52	1.93	21.37	3.55	37.10
5	19.85	14.5						
6	16.52	16.7	3.02	41.65	1.55	21.38	3.68	36.96
5-H	21.87	5.84						
6-H	18.14	17.05	2.92	41.77	1.50	21.46	2.53	36.77
7	15.67	5.2						
8	11.86	23.68						
9	9.03	23.86						
10	7.25	19.72						
11	6.99	3.59						

There is only 1-64 inch up and down work required on the web, but this is enough to give the brand, while more work would tend to pull the metal away from the flange.

Edging Pass Work Varies

In all passes of this construction, which are called edging passes, there should be more up and down work on the flange than on the head, and more on the head than on the web. This is made necessary because the diameters of the rolls are different at each point and therefore have different peripheral speeds, which causes the metal to flow differently, pulling away from the slower moving parts of the rolls more than from the faster traveling parts.

Pass No. 9, called the second edger, is very similar in design to No. 10, but the work is 19.72 per cent. instead of only 3.59 per cent. The height is 3-32 inch less than No. 10, to allow for spread, which will be greater here than in No. 10, because of the greater reduction in the web than in the open flange in No. 10. The open flange is made ¾ inch longer from the edge of the web than the closed flange in No. 10 to give the closed flange from the preceding pass a chance to lengthen, which will make it thin enough to go in the closed flange of No. 10.

exaggerated by putting a swell on the bottom of the passes; this also prevents the piece from overfilling in the succeeding edging pass, which would cause a seam.

No. 3 is called an edging pass because the piece entered on edge, that is, turned through 90 degrees from the position it was going through Nos. 1 and 2. In this pass the piece begins to take or get the shape of the rail, considerable more work being done on the web than on the head and flange. The part of the rolls that reduce the web is made quite sharp; that is, 9-16 inch radius rather than presenting a wide surface at that point, which would tend to pull the metal away from the flange more than would the narrow tongue. The swell made in the top and bottom of No. 2 prevents the piece from overfilling the pass when it spreads.

No. 4 is a dummy pass and does nothing toward shaping the rail, but makes the piece lower and the flange wider. The height is squabbed down to 4 3-16 inch in this pass and the top and bottom are made concave again to allow the piece to spread in the two following edging passes without overfilling.

In order to assure stock enough for the heavier sections, passes 5-H and 6-H are laid out for sections from 70 to 90 pounds as well as passes for Nos. 5-L and 6-L for sections under 70 pounds. By reference to the table showing percentage of reductions, the difference in the draft for the light and heavy section is seen.

Both Nos. 5 and 6 are edging passes and in both considerable work is done on the web of the piece. As in No. 3 effort is made to get the reduction and shape the piece without pulling the metal away from the flange any more than is necessary. The flange and head are tapered off in both rolls in these passes so that the piece is free to deliver itself without undue wear of the rolls. No. 6 is the first pass in which one side of the flange is made longer than the other. This is done as it comes out of No. 7, and will have one flange longer and thinner than the other, and will, therefore, go home in the flange of the enclosed roll in the edging or finishing passes.

The table shows the area and reduction in the different passes and the distribution of the area in the finishing passes. In turning the rolls, the pitch diameter of one roll is made about ⅛ inch greater than that of its mate, so that the piece will always deliver one way; that is, away from the largest roll, which makes it possible to do away with the one guide on the delivery side of the rolls. It is an advantage to have the piece deliver away from the closed roll in the finishing passes, so that the grooved roll shall have the greatest pitch diameter.

It is customary on a 24 inch mill to make the pitch diameter of the grooved roll ⅛ inch greater than that of the tongue roll. The parting between the finishing roll is ⅜ inch and between the roughing rolls ½ inch and the parting line, where collars and grooves of a pair of rolls are in contact, is made at an angle from 10 to 15 degrees, so that when the rolls are redressed, the lock can be re-established by turning off a very little at these points.

This is an important point and it allows a pair of rolls to be redressed more times than if the parting were made nearer a straight line. The rolls have to be taken out of the mill frequently to re redressed, sometimes because they have worn so that the rail becomes too high, but more generally because they become rough and do not make a smooth rail.

At the Ohio Works the finishing is in sand rolls, which will make about 3,100 tons in two passes without redressing. At Braddock, Pa., before the cold rolling process was adopted, 3,000 tons were finished on one pass to a dressing. It will be appreciated that the temperature at which the piece goes through the finishing pass has great bearing on the life of the rolls.

At South Chicago there is a chilled pass finishing as much as 5,187 tons in one pass to one dressing. Too little water on the rolls fails to keep them cool, and heat cracks or checks appear, which make the rolls rough. Too much water causes water cutting. The latter is harder on the rolls than the cutting done by steel. The water should run on the rolls with only about a 6 inch head and the quantity should be limited to the amount required to keep the rolls cool enough to prevent heat cracks.

Some time ago the Carnegie Steel Co. installed at its Edgar Thomson plant a cooling bed before the finishing pass, on which the rails are allowed to remain for a short time before going into the rolls. The rails are held on this bed about one minute and 6 seconds, during which time their temperature drops from 1,760 degrees Fahr. to 1,580 degrees, which gives the steel a close-grained structure and a nice finish. This cold rolling is much harder on the rolls than the old practice of finishing at a higher temperature.

In contrast to the cold rolling, now being employed in the above-mentioned plant, is the reheating of a certain percentage of blooms in the South Chicago rail mill. This reheating is done to make the steel roller easier and is a very effective means of reducing the percentage of seconds. But because of the rails being finished at this high temperature, it is said, the steel is not as fine a structure as when the blooms are not reheated but are finished with the heat given the ingots in the soaking pits, as at the Ohio Works.

The standard length of rails was 30 feet until recently, but now 38 feet is the standard, which requires a less number of joints per mile without making the rails much more difficult to handle or transport, as nearly all cars are 34 feet or more inside the bed.

The rails are cut to length at the Ohio Works by four hot saws, 42 inches in diameter, which revolve 1,400 revolutions per minute, are set the proper distance apart, and are so operated that all four come down on the rail at once. In order that the rail, when cool, shall have the proper length, the hot rail is sawed to a length to allow for the contraction, due to the fall in temperature.

It will be seen that the lengths vary for different mills, and will depend on the temperature of the rail when sawed. Even in the same mill different weight sections are sawed to different lengths, because the heavier sections are hotter when sawed than the lighter sections. Below is a table showing the lengths the different sections are sawed at South Chicago and Ohio to make rails that will be 30 feet long when cold:

Section lbs.	South Chicago Feet and Inches		Ohio Works Feet and Inches	
100	30	6 1/2	30	5 7/8
95	30	6 7 16	30	5 13 16
90	30	6 3/8	30	5 3/4
85	30	6 5/16	30	5 11/16
80	30	6 1/4	30	5 5/8
75	30	6 3-16	30	5 9/16
70	30	6 1-16	30	5 1/2
65	30	5 7/8	30	5 7-16
60	30	5 3/4	30	5 3/8
55	30	5 5/8	30	5 5-16
50	30	5 1/2	30	5 1/4

It is noticed that the rails are sawed shorter at Ohio than at South Chicago, bearing out the statement made above, that the rail is finished at a lower temperature at first-named point. At Braddock, Pa., they are sawed considerably shorter than at either of the above mills because of the cold-rolling process. It is very desirable to have the saw mandrel bearings adjustable so that when they become worn, which they do rapidly on account of the high speed at which the saw revolves, they can be moved until the saw is plumb again.

WHY CONCRETE CHIMNEY STACKS FAIL

By M. E.

From the day concrete made its advent in building construction its merits were fully recognized. It must be admitted that for a large number of structures there is actually no better material than concrete. It became evident very soon, however, that it is entirely unsuitable material for any purposes where it is subject to the attack of heat, products of combustion, or undiluted acids. One of the best known structures in which such conditions prevail is the chimney.

For the moment we do not want to discuss those where the structure collapsed during construction or soon after. We refer for the present only to those which decayed very soon after being put in operation. The thin walls of the stack permitted a very rapid radiation of the heat. Condensation took place on the inner side of the stack, and the condensate worked its way into the fissures, rapidly destroying the texture of the material and attacking the reinforcing steel. The stacks started to lean, to burst open, or collapsed entirely. Recently this inherent defect has been in part overcome by using a lining of burned clay extending the full height of the stack of the chimney. In the United States of America there is little difference in the cost of a well constructed concrete stack, with a lining extending the full height, against the cost of a radial brick chimney.

WELDING AND CUTTING

THE OXYGRAPH

THE accompanying illustration shows the oxygraph in an improved form as made by the Davis-Bouronville Company, and sold by the Carter Welding Company, Toronto. With this machine steel plate up to 15 in. or more in thickness is cleanly cut with a narrow, smooth kerf, along straight lines, sharp angles or curves, according to the drawing or pattern. The pantograph principle is employed, the tracing wheel being guided along the pattern laid on the table and drawn to twice the size of the desired object.

IMPROVED FORM OF OXY-GRAPH

The hand of the operator only serves to guide the tracing wheel power for moving, it being supplied by a small motor which is attached to the tracing head and which may be connected to the ordinary electric light or power circuit. A universal motor, either direct current or alternating current is used, with provision for use on either 110 volt or 220 volt circuits. The speed of cutting varies from 2 in. to 18 in. per minute according to the thickness of steel being cut.

The incorporation of a positive feed by means of the motor-driven tracing wheel is responsible for the extremely clean and accurate cut made; this results from the steady advance of the cutting torch into the work.

The machine is made in two sizes. The No. 1A is applicable to small work and die cutting, within a cutting area of 16 in. sq., a circle of 18 in., or a rectangular form 12 in. by 40 in. by extension of the tracing table. With this machine a drawing or pattern double the size of the cut to be made is required, the drawing being placed on the tracing table shown.

The No. 2 oxygraph is for larger, heavier work, has a double pantograph frame, is fitted with two cutting torches for making duplicate cuts at the same time, the position of the torches and tracing wheel being adjustable, and the entire pantograph frame moving backward from the base to allow placing of heavy plate with a shop crane. This machine reproduces the cut of equal size with the pattern, or 1 to 1.

A small disc may be noticed on edge on the tracing table. This has been cut out of the sheet shown under the cutting head and the cleanness of the cut is apparent.

The illustration also shows a recent development in reducing valves and gas control brought out by the Davis-Bouronville Co.

IMPROVEMENTS IN STEEL MAKING

Amongst war-time research work, the benefit of which will be permanent, better control of the heat treatment of steel promises valuable results. It is now widely recognized that comparatively few degrees of variation in the temperature make all the difference in the properties of the finished material. The difficulties are particularly great where large masses of steel are concerned because it is difficult to secure the same temperature at the surface and in the mass of metal. Other difficulties are introduced by the different scaling tendencies and different emissivities of various steels. Recent improvements in furnace construction facilitate the attainment of uniform temperatures, and the means and methods of pyrometry have been developed to such an extent that the most delicate heat treatment can be given with almost mathematical certainty and on the basis of a commercial repetition process.

WIRELESS FOR ALL COMMERCIAL AEROPLANES

One essential to the development of a long-distance aeroplane service for passengers, mails, and parcels' delivery is the use of wireless telegraphy. All the aeroplanes used in this service will, like every large ship, carry wireless and an efficient operator, thus making it possible to send telegrams from any part of the world, on sea or land, to the aeroplane during its voyage. The aeroplane will also receive regular messages regarding the weather conditions in the regions towards which it is heading, and will therefore be able to adjust its course to avoid fog and other dangers. It is curious that one of the first things to be transported over a long distance by aeroplane is a British wireless installation. Arrangements were recently made for the erection of Marconi wireless stations in remote parts of China—one on the frontiers of Cashmere and the other on the Chinese side of Siberia. As there is neither road nor rail available in these regions, the Marconi Company arranged for the transport of the plant by a large Handley-Page aeroplane.

WHAT OUR READERS THINK AND DO

Views and Opinions Regarding Industrial Developments, Factory Administration and Allied Topics Relating to Engineering Activity

The Revolution of the Lathey Crew

The Chap Who Wrote This is Still Out of Jail

EVERY member of the crew had been together since their infancy, all slept on the same BED, and were ALL WAYS interested in the same WORK. Hardly a thing could be done without the assistance of the others. In the silence of the night they had decided to start something the following morning immediately the OPERATOR raised his hand. They claim they had been DRIVEN to it by the POWERS above. This may or may not have been the case, but at any rate it was easily seen that they were all GEARED up for some kind of ACTION. Well, it started when the OPERATOR threw the CLUTCH into the PULLEY.

The LATHE DOG, which had been resting quietly all night, shoved its TAIL into the FACE OF THE CHUCK and took firm hold of the HEAD OF THE BOLT, and began to DRIVE it ROUND and ROUND. This started a little REVOLUTION. First the TOOL moved into position and began to CUT loose until it was BLUE ON THE NOSE, the SHAFT GOT HOT with the continual FRICTION and thinner and thinner at every TURN.

The TAIL CENTRE supported the WORK at one end but was DEAD to all surroundings. As the BOLT looked ROUND, the GAUGE remarked: "A chap your SIZE should be just right for thiS CREW."

"What do you take me for—a NUT?" said the BOLT.

"Not yet but I'll soon make you one."

"We'll take the LEAD," said a couple of HALF NUTS, and immediately they became ENGAGED, grabbed the SCREW firmly, PITCHed the SADDLE forward steadily towards the HEAD of the BOLT, which was threatened with a severe CUT in the SHOULDER but for the QUICK ACTION of the OPERATOR, who CUT THE THREAD and with a CAM but FIRM MOVEMENT released the NUTS that were the cause of all the trouble, just as the POINTED STEEL reached the NECK. The TOOL was taken out and removed to the rear, but no sooner had it reached the END than the same thing happened again. This took place several times until the NUT being tried had a FIT.

"Let the TOOL-HOLDER," said the REST.

"I can't," said the TOOL. "I must stay at my POST, besides I get a RAKE off here CUTTING into the PROFITS on STEEL'n IRON."

"Give us a REST," returned the POST. "You can only WORK when I HOLD you."

The COMPOUND REST was an elevated sort of chap and MOVED ABOVE its fellows, having GRADUATED with DEGREES at the very BASE of its career, and whenever it MOVED it saw things at a different ANGLE.

"Less of your GIB," said the CROSS SLIDE, "can't you see I can hardly MOVE?" The GIB was WEDGED in between two DOVE-TAILS and the FEATHER in the FEED SHAFT was KEYED in a GROOVE.

All the GEARS had their TEETH into one another, but it was the OPINION of the RACK that the ROOT of the trouble lay in the COURSE FEED given to the TOOL.

"This is the GRUB," said the HEADLESS SCREW.

"Why, you poor insect," said the WORM. "You do nothing but TURN into a HOLE and pull your HEAD in after you." Even a WORM will TURN sometimes.

"Quit your pushing," said the BRACKET. "Every time you TURN you THRUST your COLLAR into my FACE."

"Oh, dry up," replied the WORM.

"If I do you'll be the first to SQUEAL," was the retort.

"CAN the stuff," said the OIL. "I'll reduce the FRICTION between you fellows."

"This is SHEAR madness," said the LATHE BED. "Can't we KEEP THINGS STRAIGHT?"

"Not with my help," rejoined the TAPER ATTACHMENT, "but I often have the INCLINATION."

"I'll SLIDE along and see what I can do," said the CARRIAGE, "I've ALL WAYS been called upon to SADDLE such responsibilities and will UNDERTAKE the work."

"Some UNDERTAKING," was the GRAVE reply of the DEAD CENTRE. "Move me a little and your troubles are over."

"DEAD TRUE," added the LIVE CENTRE.

Through all this it must not be surmised that the SPINDLE had overlooked its own responsibilities. It realized that its ACTION had GREATER BEARING on the REVOLUTIONARY MOVEMENT than all the others put together. Nevertheless it was BORED THROUGH and THROUGH with the hole proceedings.

The BACK GEAR was rather a SLOW MOVING chap and his SHAFT was very ECCENTRIC and as soon as he got free, the CONE and the SPINDLE became LOCKED TOGETHER and things began to move faster.

"Why should I have to HOLD these PIECES so often?" asked the CHUCK. "My JAWS are getting LOOSE and WORN and sometimes I think I will DIE with the GRIP."

When it came to the TURN of the LONG THIN SHAFT the CHATTER again started, and in sympathy, the STEADY REST said. "SHAKE old chap, I'll SUPPORT you."

However, as soon as the SHOULDER and NECK were DRESSED and the COLLAR CLEANED OFF, the HEAD was TURNED and SHAVED OFF, and immediately it was removed from the CENTRE of the REVOLUTION it made a BOLT for the DOOR and the trouble was over.

LATHE WORK—BORING

By J. J. DIXON.

In machine shops where a great variety of work is done it is almost impossible to keep the operation of boring to special machines and, therefore, nearly all lathes have to perform a certain amount of this work—usually by the use of the twist drill being held in the spindle of the tailstock. This method is, generally speaking, successful in the case of boring from solid metal, but where cored holes have been put in the castings it often gives trouble to the operator, and is the ruin of more twist drills than all the drill presses in the shop. The following are some of the causes of the trouble and the remedy for same. First, in too many cases the core holes have been made too large not leaving sufficient metal for finishing up to size. Cored holes should at least be ⅜ of an inch smaller than finished size of bore. This allows the drill to cut metal instead of sand, as is often the case; the best twist drill made for cutting metal will not cut molders' sand for long. Another point is that the operator often uses the drills ground in the same way as if boring from the solid metal; this is not a good practice and is also detrimental to the drill. The drill for cored holes should be ground with the same cutting clearance, but almost straight on the face instead of the usual long angle or pointed drill. As a pointed drill will follow the core hole the drill should be ground more like a flat bottoming drill, and a hole that is started true in this manner will keep true much better than when using a long angle on the drill, as it is more in contact with the metal to be removed, and has not the same tendency to follow the core hole, say with a job 8 or 10 inches long in the bore. The core hole is often more out of truth the further you get towards the back of the casting. With 3-16 or a ¼ of an inch a side of metal to work on the drill started true will bore a true hole, or true enough for a light cut by finishing tool. Another fault in using twist drills on the lathe is that in most cases no provision is made in the tailstock spindle for preventing the drills from turning except the pressure on the taper fit. A slot should be cut in the spindle to take the flat on the end of the drill exactly similar to the drill press spindle. This would save a lot of trouble. also the wear of tailstock spindle which occurs when drills turn on account of not having a slot cut to receive the flat, which is shaped on all twist drills with taper shanks. Three out of every four lathe tailstock spindles are spoiled, where twist drills are used; by not making the above provision. It also provides an easier method of removing the drill by being able to use a drift, and is a decided advantage when using a floating reamer, as the socket which holds the reamer, unless provided with flats shaped on the end and a slot to receive it in the spindle gives the same trouble by turning, as the twist drill, causing a bad fit for the centres, and will soon throw one centre out of line with headstock centre. It will also be found a great saving in using small drill chucks having the same above advantage. There have been a good many accidents to operators by the method of putting a lathe dog on the drill to prevent it turning in the sleeve or spindle. Sometimes, the dog not having been brought down to the rest, a little extra pressure on the drill results in the drill turning, bringing down the dog with the operator's fingers underneath, which means a case of compensation through not adopting a simple, practical, safety first device.

PAINTING GALVANIZED IRON

By M. M.

Galvanized iron is finished in a bath of palm oil, and, as a matter of course, some of this oil, a very thin film, adheres to the metal and prevents the perfect adhesion of the paint, especially if the iron is fresh from the mills. To remove this film of oil and also to give a more perfect surface for the adhesion of paint, various washes have been recommended by various authorities. Prepare a mixture of ½ oz. each of copper chloride, copper nitrate, and salammoniac. Place these in a glass or earthen jar and add 1 quart of soft water, stirring occasionally until all are dissolved; then add ½ oz. of commercial hydrochloric (muriatic) acid. This will coat about 500 square feet. Apply with a broad, soft, flat brush. The metal will at first turn nearly or quite black, but will change to grey in a short while.

When dry, it is ready for paint. Some have found that washing the new iron with a strong solution of carbonate of soda, rinsing with clear water and rubbing dry before painting, produced satisfactory results. Again, washing the iron with strong vinegar (practically diluted acetic acid), rinsing with clear water and rubbing dry, or letting the iron stand after rinsing for a week or more, answers the purpose. In priming galvanized iron or zinc, yellow ochre ground in linseed oil and thinned with varnish adheres to the metal better than any other mixture.

TREATMENT OF PEAT.

By M. A.

In the improved Ekenberg process of treating peat, as tested at Chateauneuf, Bretagne, France, the raw material is first compressed to reduce the water from about 90 per cent. to 60 per cent. It is then subjected to the action of superheated steam at 160 deg. C. for 25 minutes, and is afterwards again compressed, or at once dried in special chambers, or in the open air. "Turbon," as the product is called still retains 20 to 25 per cent. of moisture. It yields 61 per cent. of volatile matter, and its calorific value is 10 per cent. higher than that of ordinary peat. It is recommended for direct firing, for gasworks where ammonia can be recovered, and especially for power gas for internal-combustion engines.

Do You Know That

At the end of 1917 there were about 140 electric furnaces installed in Great Britain, and the number has been considerably increased since then.

* * *

That a leading British trade journal contemplates the sending of its overseas circulation to the British Dominions and Colonies and the great trade centres of the world by air as soon as it is possible.

* * *

The extremely minute globules of oil, which are often present in feed water from condensers, are only about 1-1000 millimeter in diameter, and pass through the finest filtering medium. Their removal has been accomplished by means of the action of electric current, which causes these globules to coalesce and to combine into larger droplets, which can be successfully filtered out. The same inventor has also devised an apparatus for removing dissolved air.

* * *

The oxy-acetylene process has been successfully applied to the burning of holes in the mass of solidified iron called a salamander, which accumulates in the bottom of a blast furnace. Instead of drilling holes for dynamite, with the aid of a diamond bit, the hole is sunk by means of oxy-acetylene. As the cutting action of the gases continues, the pressure blows the molten material from the hole. It is found that one tank of oxygen is sufficient to sink a hole four feet deep.

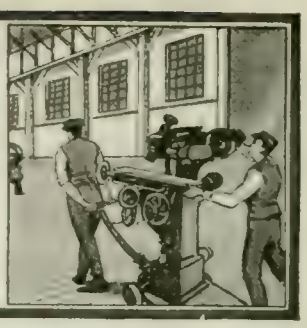
* * *

Germany, during the war, made transmission belting out of steel and paper. Steel belts have been in more or less common use for a number of years, but the use of paper for transmitting power is at first sight somewhat of a startling innovation. The belts are made by several different processes. Some are made of plaited or knitted paper yarn, and thus have no transverse threads, making the edges very strong and eliminating fraying. Other belts are woven or knitted in tube form, and afterwards flattened out and stitched together.

* * *

In a hand-fired furnace about one-half the combustion takes place in the fuel bed, and one-half in the combustion space? The fuel bed acts as a gas producer and a gas retort; in it the solid fuel is gasified by the combustion of the fixed carbon and the distillation of the volatile matter. The gases rising from the fuel bed contain, at times, as much as 32 per cent. combustible, and no free oxygen to burn it. Hence, to burn these gases, air must be admitted over the fuel bed and mixed with the combustible gases, and the mixture burned in the combustion space. The oxygen flowing through the grate is all used up as it passes through the first three or four inches of the fuel bed.

DEVELOPMENTS IN SHOP EQUIPMENT

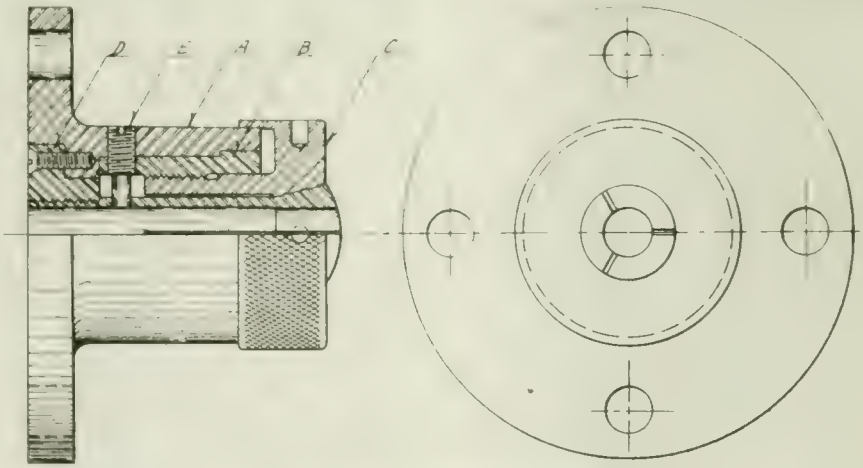


Makers of equipment and devices for use in machine shop and metal working plants should submit descriptions and illustrations to Editorial Department for review in this section.

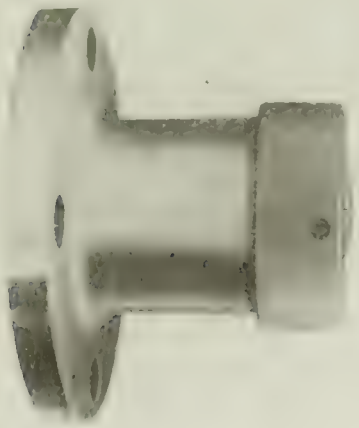
THE BEMIS LATHE CHUCK

The collet chuck shown in the illustrations is the invention of Edgar W. Bemis, Worcester, Mass., and is being placed on the market by the E. W. Bemis Machine Co. of that city. While primarily a lathe chuck, its usefulness is evident in range of diameters handled and in quickness and accuracy of operation with all types of metal turning machinery.

A distinctive feature of the Bemis chuck is the method employed for operating the collet jaws to centre and to grasp the work. The jaws have absolutely none of the longitudinal movement which characterizes the usual chuck of this type when the stock is of varying diameter. The jaws are held securely in the chuck body. They do not ride upon it. Instead a closing member rides upon the taper of the jaws, to open or close them. They themselves cannot advance towards or back away from the cutting tool. As a consequence absolute uniformity of



SECTIONAL VIEW OF CHUCK



NEW COLLET CHUCK

length of work is assured, which is of great advantage in cutting off stock.

Referring to the drawings, the chuck consists of body A reinforced by a sleeve B, which is threaded to receive the chuck-closing member C. This member is knurled for operation by hand, which under most circumstances is the means employed, and also is provided with holes to take a spanner wrench. The collet jaws, which are interchangeable for varying sizes of work, screw into the steel nut D, and are held firmly in place by the headless screw E.

The Bemis chuck is of rugged construction, designed to insure its long life, and is made in two styles, the one flanged for bolting to a face plate, the other threaded to screw onto the nose of the spindle. It is furnished in two sizes, the smaller taking collets from 1 32 in. to ½ in., the larger taking collets from 1 16 in. to 1 in.

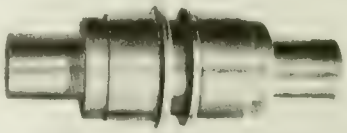
The Hanson Friction Clutch.—It is a well known fact that the majority of present day clutches are so large and heavy that they have a tendency to cause trouble due to their weight alone and do not lend themselves to their ready incorporation into machine tools and other locations where appearance and reliability are matters of some consideration.

The clutch recently developed by the Hanson Clutch and Machinery Co. of Tiffin, Ohio, eliminates the cumbersome features of many older types and permits the installing of an extremely powerful clutch in very restricted locations. Its light weight, small size and neat appearance make it particularly adaptable to machine tool use.

Its capacity for transmitting large amounts of power is very great and where the outside diameter of a clutch is limited by design requirements the required horsepower can be transmitted by decreasing the outside diameter and increasing the friction surface.

Owing to the fact that the clutch is of small diameter and carries no exposed members it is admirably adapted for high-speed work. When engaging it takes the load gradually without a jerk owing to the double cone wedge expansion of the steel ring which grips the cylinder.

Several types are made. Fig. 1 shows a friction cut-off coupling by means of which a line shaft or any part of it may be cut-off or operated without interfering with the rest of the shop. As will be seen two coned friction disks engage



DOUBLE CLUTCH EXTERIOR.

with a double cone friction ring when the clutch is closed by means of the lever system actuated by the operator.

The clutch is adjusted by means of a threaded ring on the coned hub of the clutch. Its simplicity and positive uniform adjustment make it one of the simplest and most easily adjusted clutches and any unskilled workman can adjust it with success. All toggles are made of cast steel carefully proportioned and their complete enclosure by the

guard renders the clutch extremely safe in operation.

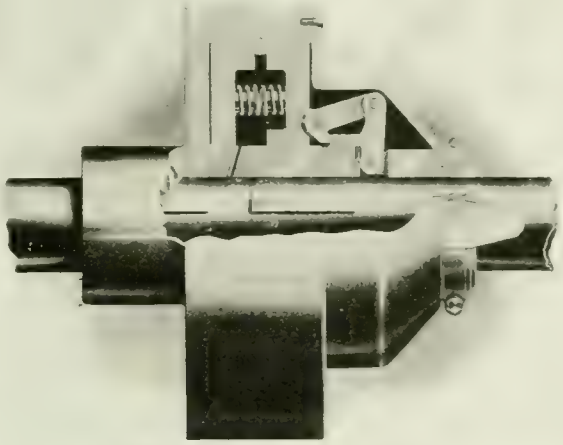
The guard serves another useful purpose as it is used as an oil retainer, eliminating the necessity of constant lubrication, it being necessary to refill only every few months.

The clutch is thrown into and out of engagement positively and is locked in either position. It is impossible for it to engage itself even partially by centrifugal force.

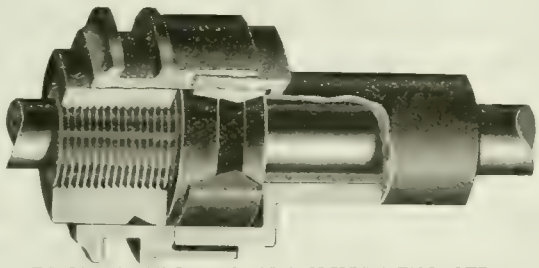
In the friction cut-off coupling illustrated the ends of the shaft meet in the coned hub. This insures the absolute alignment of the shafts and a phosphor-bronze bushing is provided to carry the end of the extended shaft.

In the clutches used for machine tools and in other locations where small diameter is desirable a variation on the clutch above described is used. The operating sleeve engages with a wedge member, which in turn brings the two cones into engagement with the friction ring. As may be seen the resulting clutch is compact, cylindrical and perfectly balanced. All working parts are completely covered and are kept free from grit and dirt. The clutch can readily be adjusted to any desired tension without removing any parts by means of a single sleeve, which gives a uniform adjustment at all points around the shaft.

The double clutch shown in Fig. 3 requires but little more space than the single and is provided with two friction cylinders for mounting pulleys, gears, sprockets, etc., as desired, the dimensions of the sleeves varying to suit requirements.



CUT OFF SHAFT COUPLING.



SECTION SHOWING SINGLE CLUTCH ENGAGED.

Two varieties of friction surfaces are regularly applied. The standard surfaces are steel and iron bathed in oil and of long life. Where required friction surfaces are supplied of friction paper and steel. This type of clutch is designed for slow speed and heavy duty.

PAINT FROM A SANITARY POINT OF VIEW

By M. E.

Paint, considered in its broadest sense as including limewhiting, distemper, etc., is of marked value from a sanitary point of view. Hence the official regulations for limewhiting or whitewashing cattle pens, workshops, etc.

In cottages and tenement houses, frequent whitewashing is very desirable, but, unfortunately, in such cases the appearance not being of great importance, only too often the work is done in a slipshod manner. The common method is to "turn the ceiling over," which means that the whitewash on the ceiling is not washed off as it should be, and an entirely new coat put on, but that it is just damped sufficiently to moisten it through and is then allowed to remain on, having been redistributed, so to speak.

For several years past great outcry has been made as to the necessity for providing washable walls and ceilings, hence the production of the so-called washable distempers and water paints.

The extraordinary thing about the matter is that walls done with a washable material are, as a matter of fact, very rarely actually washed, once a year, at the time of spring-cleaning, being thought sufficient, and even then a dusting down being frequently employed instead. It is perhaps fortunate for the manufacturers of some grades of the paint referred to that this negligence is customary, because some of the paint sold as being washable is really far from possessing that quality, but can readily be rubbed off with a damp rag. The class of paints which are now coming to the front and known generally as "flat wall finishes" or "oil bound paints," are really washable and can be scrubbed even a day or two after the application.

There are several rooms where the provision for constant washing is imperative. The walls and ceilings of the bathroom and kitchen, for instance, should always be finished in such a way that the moisture which forms upon them may be frequently removed by a thorough cleaning, and this should be done at least once a week. Again in bakeries, where there is a moist, hot air, it is very desirable to give a finish to the walls which will permit of cleaning down at frequent intervals, while it is equally essential in hospitals. For both purposes the best finish is glossy enamel, and although this is costly at first, it becomes cheap in the end. Everything of course depends upon it being applied properly to a carefully prepared surface. One well-known maker advertises to the effect that the more his material is washed the better it will look. While this statement may be taken with a grain of salt, it is a fact that all good enamels—and the one referred to is certainly a good one—will permit of frequent cleaning down with water, to which has been added a very little ammonia or soda.

To promote cleanliness in rooms, it is well to adopt a plan followed on some Government buildings, which is to insert a hollow molding at the junction between all floors and walls and sometimes also between wall and ceiling, in other words, to round off the corner, and at each internal angle of the rooms is placed a piece of wood shaped like a quarter of a sphere, thus preventing the accumulation of dirt.

DESTRUCTION TESTS OF ELECTRIC PLANT

Tests to destruction are occasionally used in engineering works to discover how much ill-treatment a machine will stand and which part is really the weakest. During the war every electric power station in Great Britain has been subject to very much the same kind of treatment. Thanks to the tremendous demand for electric power in munition works (ninety-five per cent. of these works were driven electrically) all the plant in the generating stations, boilers, dynamos, switchgear, transformers, and mains, was overloaded to a pitch which might well have meant destruction. The manner in which the plant stood up to this long and exacting ordeal is a magnificent proof of the sound design and construction of British electrical machinery and appliances. The difficulties were increased by the fact that, owing to the night and day demand it was generally impossible to overhaul the plant. In one typical case most of the boilers in the station had not been cleaned for a year. Now that this tremendous strain is relaxed British engineers realize that their electrical machinery has done better than ever they, in their most sanguine moments, would have expected it to do.

HIGHER SPEEDS FOR ENGINES

The amazing pace of technical progress in petrol engines for airplanes and automobiles has its benefits in other fields. It is now seen that stationary engines driven by internal combustion can be made lighter and cheaper by adopting a higher piston speed. A radical departure from standard design is required. Again, it is believed that we are on the eve of far-reaching changes of practice which will facilitate the use of hitherto untried fuels and the economical combustion of weak mixtures when engines are running on light load. The whole effect of these discoveries should be a great impetus to the employment of stationary oil engines.

ANNOUN

TO OUR

FOR some time past we have been facing a vital problem, and the coming of peace has accentuated this to such a degree that a decision could no longer be delayed. As this decision directly affects our customers, we are losing no time in acquainting them with the situation.

Briefly, it is this:

On December 31st, 1918, the Victor Saw Works, Limited, completed their sixth year in Canada of the manufacture of VICTOR Blades.

Our experience during these six years, with the depressions of 1913 and 1914, inflated manufacturing periods of 1915, 1916 and 1917, and declining prosperity to a nominal base in 1918, has forced us to arrive at a conclusion which we at first refused to acknowledge.

There is not a market in Canada for hack saw blades which warrants a plant for the manufacture of this product.

We have been a long time in coming to this conclusion—we have analysed the past—investigated the future possibilities—considered various ways of meeting the difficulty, and have regretfully decided that there is no other course for us to adopt than to discontinue the manufacture of VICTOR Blades in Canada.

Of course we realize the possibility of staying in the market by reducing our quality, but this is an alternative which we refuse to consider. The VICTOR Blade is undoubtedly the leading hack saw blade on the market today. This is a statement we very seldom make, but one which we have demonstrated to be true. We are told that our service is not approached by any hack saw firm in America, and our policies are unique. We are naturally very proud of these distinctions, and we will not sacrifice them one iota to make a success of any market.

CEMENT
RIENDS

CANADA has been good to us, and we have a strong, sentimental attachment to the business men of the Dominion that only the stern logic of facts has been able to offset. For the past six years we have been one of them, facing the same problems and contributing our mite to the common good. Our intercourse in the future will naturally be limited by our decision, but we hope and believe that our relations will be none the less cordial.

For the present we shall continue to do business at the same address. When our present stock is exhausted, our Canadian interests will be taken over by the Victor Saw Works, Springfield, Mass., who have been in business for the past twelve years, and who manufacture VICTOR Blades on the same high standard of quality and are governed by the same principles and policies as we have followed in Canada. If there is one essential that we will pass on to them, it is the necessity for giving the finest kind of service, and as we have been intimately associated with them, we can speak with confidence of their determination not only to maintain, but to improve our standards.

As an earnest of this, we would point out that Mr. C. C. Jackman, who was formerly superintendent at Hamilton, is now Factory Manager at Springfield, and that Mr. E. S. Bradford and the writer occupy the same position in both Companies—Treasurer and President, respectively.

Mr. H. W. Holmes, our Manager, will continue to care for our Canadian affairs, and our sales personnel will be as heretofore.

May we take this opportunity of thanking you in all sincerity for the splendid co-operation and encouragement you have given us in the past. We have tried hard to merit it—we will continue to try just as hard, confident that we shall receive a like measure of your support.

Yours very truly,

Victor Saw Works, Limited

W. F. POLLOCK, President

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Must Settle Tariff Soon

TARIFFS and politics have grown up together in Canada like crackers and cheese. The condition is unfortunate because it has prevented the study and application of tariffs becoming the keen scientific study that it should be. Just how far it is possible or desirable to take the matter of tariffs out of the arena of political platforms is problematical. Whenever a leader casts about for a platform he invariably lays hands on the tariff pile, and if he can't cart away sufficient lumber to build enough platform to stand on while getting elected his career as a politician is destined to be painfully short.

As a matter of fact, the Liberal party is not a party of free traders. They had for years plenty of backing in the Dominion House to sweep aside every trade barrier that had been erected. They had their opportunity to have "free trade as they have it in England." But they didn't do it. The real out-and-out free traders are in the new political party that is spreading eastward from Western Canada. The Grain Growers are free traders and nothing else, and the United Farmers of Ontario is the political reflection of the same belief. Both of these organizations possess great voting power, and they will have to be reckoned with. They have gone well past the experimental stage, and have a pretty certain idea of the direction in which they are driving.

Against these factions we have at the far end of the pendulum, the Haman's gallows group of protectionists. They would have Canada fenced around with a tariff wall so high that Jacob's ladder wouldn't reach up to the first knothole. And the unfortunate part is that these extremists seem to have developed the faculty of forcing themselves always to the top of the heaps and acting as spokesmen for men who do not hold views nearly as extreme as those expressed by these ultra-extreme leaders.

The present is not the time for tariff matters to be left to either of these extreme factions. Canada can't have free trade, neither can Canada have any Haman's gallows enactment, and that much might as well be recognized right at the start. The real solution will come when the great mass of farmers, who are moderate in their views, and the great mass of manufacturers, who are also moderate, come together and understand each other's problems.

At present they are not coming together. They are drifting apart.

They are trying to get into the impossible position where they would make it appear that the interests of any one section are greater than those of the entire community.

There are farmers in Canada now, and there will be farmers for all time to come. The more farmers we have and the more prosperous they are, the better for the country.

Likewise there are and will be manufacturers, and their success will be communicated to the entire district in which they operate. The preamble to any tariff discussion should be a sincere and an honest attempt to let farmers see the actual conditions under which the manufacturer works, and the manufacturer views the real conditions under which the farmer carries on his calling.

That's the big chance, and it's worth a big effort to bring it about.

One thing that would tend to popularize a tariff would be an enforcement of the principle that the protection of a tariff carries with it a very grave responsibility. Tariffs are not blanket orders for a man or a group of men to go ahead and make millionaires. The industry receiving favors under a tariff should discharge obligations commensurate with the considerations shown it, and the Government fixing a tariff should KNOW what these obligations are, and it should KNOW exactly to what degree they are being met or dodged. The Government should know also the conditions under which the Canadian manufacturer buys his raw material. If he cannot buy on terms equal to those secured by American firms making an article to enter the same competitive market, how can he be expected to meet the low-cost article, and operate at a profit?

The tariff and kindred matters should receive attention shortly. Business is being conducted on a hand-to-mouth basis in many cases because firms are afraid to launch out. They do not know what is ahead. They expect the war tax to come off, but they don't know when. Raw material is being held up for shipment into Canada in the hope that the tax will come off and the seven and one-half per cent. will be saved. These matters are not conducive to development.

A POLITICIAN regards "backbone" in a paper as refusing to see the other side of the question.

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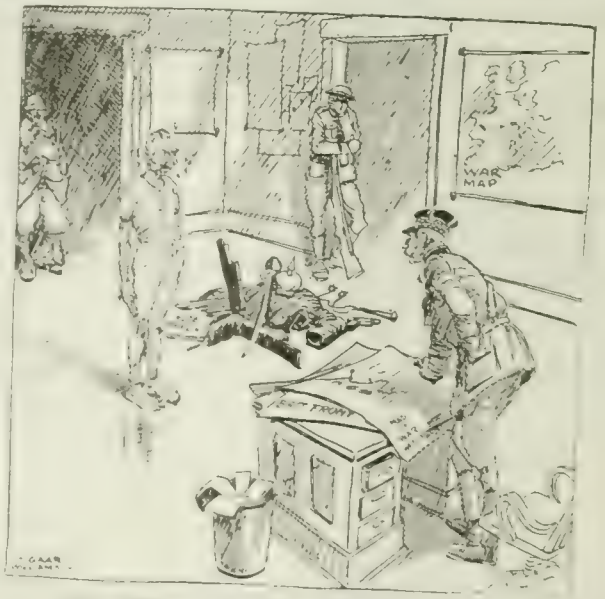
MUNITION boxes are being used in some places for garbage purposes. The trouble in such an arrangement is that the landscape suffers. For after all, what's more artistic than an old boiler, a soap box and a 1910 dishpan lined up to greet the garbage collector?



"Now William, What Were You About To Say?"
N.Y. Tribune.

Work is the Safeguard

DISCUSSING the very important matter of price adjustment, it is interesting to publish the opinion of C. Graham Drinkwater, vice-president of the Canadian Fairbanks-Morse. Referring to views expressed in a recent edition of CANADIAN MACHINERY, Mr. Drinkwater says:—

"The editorial on Price Adjustment in CANADIAN MACHINERY of Jan. 23rd is timely, but, in my opinion, the argument is unsound. To the question, 'When will the price of pig iron come down?' the man who answered by inquiring when prices in general would drop, should have been answered by a clear and definite statement—'Just as soon as the production exceeds the demand.' In other words, we **must** differentiate between classes of trade. We have stopped shooting each other, and this tremendous fact has suddenly affected a great many manufacturers who were on war work and on a war production basis, but feeding must go on and the demand for foodstuffs continues to be abnormally high. Therefore, lower prices in certain lines seem inevitable.

"Since dictating the above, a letter has been placed in my hands, reading in part as follows:—

"'We have dropped to the lower level at this time, not because of any justification for so doing due to any lower costs of manufacture (as such lower manufacturing costs do not yet exist) but because of a feeling that the jobber, in connection with the problem of his stock replenishments, will prefer right now a condition of known and easily recognizable stability to one of uncertainty as to the future.'

"This, we believe, is wise trading. If the demand can be stimulated by lower prices and our factories kept working, even at some sacrifice of profits, until the situation clears, surely both buyer and seller will benefit; factory organizations will be held together; and as much as is practical and possible done towards absorbing our surplus of labor."

The last point is well taken: If Canada wants to get safely over the period of unrest on which the world has entered; if she wants to nip the Bolshevist in the bud, and iron out as many of the social wrinkles as possible, **work and employment** will do it.

What will be the use of dividends and earnings if we have hungry men in the streets waiting for a pretext to throw brick bats through the windows?

THIS weather may be a bit mild, but if you've got any notion of shedding the old wool shirt and shakin' the moth balls out of the balbriggan, don't you do it, Si.

THEY do tell that a shell buster, applying for work as a full-fledged mechanic, struck a snag early in the game. The foreman asked him how many thousandths there were in an inch, and he replied, "Never counted 'em, but there must be a h—— of a lot."

TIMES have changed a powerful lot. About five years ago a paper would have got into trouble for calling the Kaiser a pinhead, an assassin and a jackass. And now you're apt to be took for a spy unless you do.

THE Halifax *Herald* tells us that Nova Scotia "is no place for calamity howlers." No doubt that's so. But sow thistles and mustard grow in the oats no matter how much you don't want them.

The Work of the Peace Conference

THE delegates that are going to determine the issues "Since dictating the above, a letter has been placed good many things to discuss.

They are talking of the formation of a League of Nations, of the disposition of colonies, of the freedom of the seas, of a hundred and one things.

Meanwhile the old mess that started the whole rumpus continues to dwell in safety, and latest reports state that he looks forward to the time when he will return to Germany.

One of the first things the peace conference ought to do is to make it certain that the arch-assassin of Europe shall look forward with certainty to the day when he shall stand on the gallows and pay the just penalty of his crimes.

THEY SEEM UNBELIEVABLY SMALL.
Indianapolis News.

Why Should They be Held?

THERE are members of the Canadian army still in this country who want their discharge, and cannot get it.

They are not fighting. They are not drilling. They are not protecting property.

In one case a Toronto boy is trying to get his discharge because the manager of the factory in which his people are interested is sick and away from business. The soldier understands the business, which is a particular one, and his services are needed badly.

Requests have been made to several of the authorities, but without success. The only answer received is that he will get his discharge when the rest of his unit is let out.

If the chief work now is to get the army back into civil life, it would seem to be good policy to release that soldier now and be glad of the chance to do so. There is a position open for him and his services are needed.

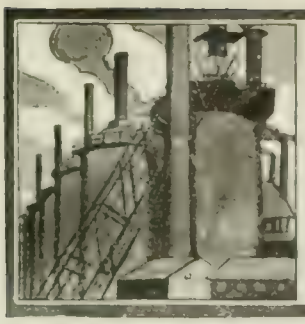
THE United Farmers of Ontario are organized to show how the man in the city should be taxed.

* * *

IF THE period of reconstruction is going to be made easy by the passing of resolutions, this country ought to find the grease on the skids a foot thick.

* * *

A WOMAN is left in Toronto with a family of seven children. Her husband died shortly after being discharged from the army, and according to some hitch she can't get a pension. Some person in authority ought to take a yank at the ball of red tape and see to it that support is forthcoming, whether it bears the regulation tag of pension or not.



MARKET DEVELOPMENTS

Buyer and Seller Are Coming Closer Together

Price Adjustment is Being Proceeded With—Some Equipment is Asked For by the C.N.R. Shops—Scrap Market Remains Dead as a Door Nail

CHANGES that have taken place in the price lists during the week indicate that the process is developing that will bring the buyers and sellers nearer to the point where they can proceed and do business. There's a big need for an acceleration of this movement, because in some sections it is quite evident that the holding back and waiting policy is going to be carried to a dangerously long extent. Steel plate is one of the greatest lines imported. In fact, for the fiscal year ending March, 1918, the imports of plates amounted to $4,569,231. The price has had a wild career during the war period in this country. They reached a point as high as 15c per pound, which is at the rate of $300 per ton for a short interval, and for some time 12c was the prevailing price. Government action placed the figure at 10c, and there it rested at the signing of the armistice. It has declined until now 6c can be stated to be the base price for plate at Canadian warehouse. This price came from a desire to protect jobbers and dealers against loss of business.

Sheets, especially the heavier gauges, invariably follow plate and they have done so, lower prices being quoted.

Steel mills in Canada will be well served if they receive generous orders for rails from the Government now. Their equipment for the most part is intact, and stands as it did when it was part of the war machine, and is capable of very large production. The shutting down of the steel making plant of the Scotia Steel and Coal Co., and the maintenance of the coal mining staff may mean a surplus production of coal there unless there is sufficient shipping accommodation to relieve the situation.

The scrap metal market remains dull. In fact, "stagnant" is a better word. There are no deals put through, and the chances are that the claims made by the dealers that they are losing money on present operations are quite correct. Dealers are not anxious to buy even at the present battered down list. They fear further drops in prices, and do not care to get caught in a declining market, especially when there is no urgency in the situation to force them to buy.

Dealers in machine tools are being asked this week for prices and deliveries on a number of machine tools for the Canadian National shops at Leaside. Sales are being made in several other lines, but they are not yet of sufficient volume to make it appear that anything approaching a revival of buying in machine tools is taking place. Dealers representing some of the large U.S. makers of machine tools report that a very large export business is being developed with Japan, and that big shipments are going forth regularly to that country.

MONTREAL CONDITIONS DO NOT SHOW MUCH TENDENCY TO REVIVE

Special to CANADIAN MACHINERY

MONTREAL, Que., Feb. 6.—In the face of the general unsettled conditions it cannot be said that business has improved, but a despondent feeling is far from being apparent throughout trade circles. Operations in many lines are less pronounced, but there is little to indicate that such conditions will continue for any lengthy period. It is anticipated that the Government will take some action to relieve the increasing unemployment situation, and with the industries gradually reverting back to pre-war enterprises the prospects for the future are more encouraging.

Steel Continues Quiet

Little can be added to previous reports setting forth the listless character of present steel activities. Mills are still in operation, but the high pressure of a few months ago is conspicuously absent. Present activity is confined to working off uncancelled orders that have remained on the books, and as contracts for future business are very light the curtailment of production is a natural consequence. Many mills and furnaces are being subjected to temporary shut-downs for the reported purpose of overhaulage and repairs, as it is affirmed that these are essential after the exhaustive operations of the past period of abnormal production. Operating conditions are considerably changed from what they were a few months back. Whereas, six months ago the price of the product was an inconsiderate factor, and when operations could be carried on without a thought of the cost involved, to-day the manufacturers are confronted with a situation where they must virtually stop production or continue to produce stock that must ultimately be disposed of at a figure much below the present cost of production. The Nova Scotia Steel and Coal Co. have announced their intention to suspend operations on their blast furnace and take advantage of the present quiet period to carry on the necessary repairs. Several of their coke ovens will likewise be closed for needed repairs. Further curtailment is also anticipated. Steel dealers here report a steady but comparatively light business. No tendency is shown to carry heavy warehouse supplies, but many are looking forward to a partial return of former activity in the early spring. Local prices are maintained, but basic supply quotations have declined. Future business is little in evidence.

Dullness Still Prevails

In addition to the general quiet tone of the metal situation the market might be characterized as listless, as little apparent interest is displayed at the present time. A feature of existing con-

ditions is the continued curtailment that is shown in production, as producers are showing a marked reluctance in stocking material in face of the high cost, and the gradual but steady decline to lower price levels. Trading in copper is very light and present business is apparently for immediate needs, as large sales are conspicuous by their absence. The local market is quiet but prices are maintained at 25 and 26 cents per pound. Tin is virtually in the same position with buying confined to present requirements. Imports are still controlled by certain British regulations. Quotations locally are nominally firm at 70 cents per pound. Demand or inquiry for all metals is very quiet but prices are relatively firm as producers claim that under the present high production costs it is impossible to decline much further. Last week's quotations are maintained on all metals.

Machine Demand Irregular

It would naturally appear, from the quiet tone of general business, that machine tool activity would be on a par with other industries. This, however, is not altogether the case, as reports show that the market is one of fairly good demand but rather spasmodic in character. The bulk of the business passing at the present time is in connection with pulp and paper machinery and shipyard equipment, with some demand for railroad tools. Dealers are not taking an active interest in the disposal of the equipment that has been used in the shell factories. A considerable quantity of these machines have been absorbed for general work, but the great volume of special machines are given little attention. Dealers are not anxious to take these for stock purposes but are willing to dispose of same if an inquiry comes through. Delayed settlements are a deterring factor in the readjustment of the industry.

Local Activity Only

"Let the prices quoted stand for another week. Trading is so quiet that we scarcely know we are in business. Our yards are well stocked and buyers are few. Light regular sales of machinery scrap are being made to small foundries, but general activity is very dull." This virtually defines the present situation in the old material market and indications seem to point to a continuance of such conditions for some time to come. The reported closing down of several blast furnaces is adding to the demoralization of the old metal and scrap industry.

POINTS IN WEEK'S MARKETING NOTES

Montreal reports little changes during the week. Conditions there are reported as dull.

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As reported last week, the steel making plant of the Nova Scotia Steel & Coal Co. has shut down. Coal mining is continuing and there is a likelihood of a surplus production, unless the shipping facilities are quickly improved.

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It is expected that the steel companies in Canada will soon get fairly large orders for rails from the Dominion Government.

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The Canadian National Railways are asking for prices and deliveries this week on a list of some fifteen machine tools for the Leaside shops.

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Steel plate was marked down this week to 6c per pound from Toronto warehouses. The explanation is that close competition and a desire to protect customers led to coming to the lower price.

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A very low price is offered now for old auto tires, the market not being much over 3½c per pound. Those who have much of this material should hold for a better price, if they are in a position to do so.

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The scrap metal market shows no change. Dealers don't want to buy at even present low figures, fearing further drops in prices. There are plenty of sellers who would lose if they cleared out at to-day's figures, but they fear larger losses if they hold on.

—

Pittsburgh looks for a decreased production at the steel mills, which increased their capacity 40 per cent. during the period of the war. Even a 50 per cent. operation now would mean more steel than the 1906 capacity.

GOVERNMENT WILL BUY STEEL RAILS NOW

Orders For Large Tonnage Are To Be Placed In The Near Future

OTTAWA.—Estimates for the Canadian National Railway System, which have been prepared by the Board of Directors, and which, it is said, call for expenditures totalling $60,000,000, will be before the Cabinet for consideration during the coming week. The appropriations proposed are for additions to railway rolling stock and equipment and for completion of certain branch lines in Western Canada which are required for feeders for the system's main lines. Already orders have been placed for a large quantity of steel rails and accesssories to be used in making the contemplated improvements and extensions of the national railways.

Proposals that the Government should add several lines of railways the Canadian system have been made to the Minister. It has been suggested that the Federal Government should acquire the St. John Valley Railway, already operated as part of the Government railways; the Alberta and Great Waterways Railway, now controlled by the Alberta Government; the Edmonton and Dunvegan Railway, and the Pacific and Great Eastern Railway of British Columbia.

RAILWAY SHOPS BUYING TOOLS

Other Business Moving is More Scattered—Prices of Plates and Sheets Are Lowered

TORONTO.—Some of the dealers seem inclined to think that the prospects for the Canadian manufacturer entering the export business are not bright at the time. They see in the list of restricted material entering the Old Country more symptoms of this. Machine tools are now included in those things that can only be allowed into Britain on the securing of a license for the purpose. In fact there is a feeling in some quarters that the British manufacturer had turned from munitions work well in advance of this country, or the States either for that matter, and was well in shape to turn out old lines as well as new when the war ended. It is known that orders are not coming to either United States or Canada in anything like the volume that was anticipated, and the supposition is that the firms on the other side of the water are in good shape to handle the business, and are not going to do anything to encourage importations where the bill can be filled by material turned out at home.

As noted in these columns before there are English lines on the market that have been absent for some time past owing to the war, and the effect is to bear down on prices by providing another active competitor in the market for business, for competition very often has more to do with prices than anything else.

No Improvement Here

Some of the transportation companies are holding their scrap rather than allow the yards to take it at present offerings, or grade it according to their own liking. Dealers state that little business is being done at the battered down price list that is quoted elsewhere in this issue. They are not anxious to buy material. Those who have any accumulation of stuff in their sheds are anxious to sell for fear that prices may go lower. They will probably lose money if they sold now, because the material they have has probably been taken in at war levels. But they figure out that it would be better to take the loss now and have it done with than to hold and take a chance on having to absorb a bigger loss a little later on. On the other hand the same condition keeps the dealers from showing much tendency to buy. They fear to move past present requirements for fear of being caught again on a declining market. As one dealer put it this morning: "There are lots of ways we can have a better time losing our money than by going out and buying heavily at the present

prices." These prices are low when compared to war figures, but they are not low when lined up against a ten year pre-war period. For instance copper sells now for about 15c, while a pre-war price over a period of years would show a value of about 12½c to 13c.

Should Hold Rubber

A number of dealers in the country that have scrap rubber have inquired for a quotation. The same question is also of interest to garage men, where old tires very often accumulate. The present price for this material is 3¾ cents per pound. This is low, and the chances are that it will reach a higher level before so very long. In fact it would not cause any surprise to see this going to 8c. It would be much better for a person to hold this material for a while, as some of the mills are known to be short of raw stock, and the move toward a better price may be made almost any time now.

Prices Are Down

Further price concessions are noticed this week. Ship plate is quoted locally with a spread of $6 to $6.50, but we quote $6 as the base price because dealers will recognize that figure. Competition for business is really the cause for the lower figure. A big job that was being figured on in the eastern part of Ontario last week caused the 6c price to be introduced to the market. The jobber figuring on the work depended on his dealers here getting him the best possible deal on the supply of material, and for this reason the price was lowered to 6c, and it stays there. Local warehouses are beginning to get their stocks replenished with material that has been secured at the lower price, figuring on the three cent. price at U. S. mills. The amount to be paid in war tax varies according to the place of production and shipment. It is fixed by the Canadian Board of Appraisers who have an office located in New York.

Sheets show a tendency to come down also from the high levels of the past year. Thick sheets like ten gauge follow plate quotations very quickly.

Dealers do not seem to care to state definitely their feeling toward lower prices, but there is a feeling growing that they show a decided move now toward arriving as quickly as possible at the very best selling proposition they can look up to the trade. In this way they believe they will be able to give some confidence and assurance to the man who does not know whether to come into the market or not. Some of the railway companies, steam and electric, are sending out "feelers" from time to time on purchases they have in mind, and some of them are about convinced that the time is ripe for them to get out and buy, as prices are highly satisfactory when compared to the quotations they received some months ago. And what is more they can get deliveries now within very good scope, whereas a few months ago a buyer was simply at the mercy of the mills, and the mills in turn were at the say-so of the war machine.

The Canadian National Railways have sent out specifications for some 15 machine tools for the shops at Leaside, which are to be used as soon as necessary for repair work. The machines asked for are not regular railway shop equipment, but mostly general purpose lathes, planers, etc.

There is a fair volume of business moving, and several sales have resulted.

Representatives of American machine tool makers in the city this week report that some of the plants in the States are working full time and that they are sending very large shipments to Japan. In fact it seems that they are developing a business there that is greater than anything they had in pre-war times. Sales are also reported in large quantities to Sweden.

PLANT OF NOVA SCOTIA STEEL AND COAL STOPPED MAKING STEEL

Special to CANADIAN MACHINERY

NEW GLASGOW, Feb. 6.—The plant of the Nova Scotia Steel & Coal Company suspended steel-making operations to-day. The blast furnace is being banked. One battery of coke ovens will be maintained in operation for the purpose of accumulating a stock of coke, and during the shut-down thorough repairs will be made to the remaining coke oven batteries.

The suspension of steel manufacture will lessen the demand for coal, and it is expected that some idleness will result at the collieries.

There is a tendency to increased production of coal, due partly to the return of miners from the front, but more particularly to the workmen attending their work more regularly. This is a result of the feeling that employment in coal-mining is not so assured as it has been for the past four years. While there is just as great necessity from the national standpoint for increased production of coal in Canada, yet the situation in Nova Scotia is approaching the point of over-production because export of coal to Montreal and other usual markets for Nova Scotian coal is temporarily prevented by the high cost of steamship freights. This particularly affects the Dominion Coal Company, and will necessitate the sale of its coal output in Nova Scotia itself. If the outputs increase by the return of miners from the front it will result in a surplus coal production in Nova Scotia, unless the Dominion Coal Company can obtain the release of its coal-freighting steamers which have during the war been under Admiralty requisition.

The suspension of steel manufacture at Sydney Mines is of course a prelude to the suspension of manufacturing and rolling operations at the New Glasgow Plant, after the stock of ingots has been used up.

Part of the recent orders for equipment from the Canadian National Railway has been allocated to the Eastern Car Company at New Glasgow, which will assure one or two months' work on a reduced basis of working organization, but the order is not of sufficient size to affect the situation so far as steel manufacture is concerned.

The Nova Scotia Steel Company is going ahead with the construction of two freighting steamships to the order of the Canadian Government.

The Dominion Iron & Steel Company is working on the completion of rail orders given by the National Railways before the signing of the Armistice, which will give this company a partial outlet for its production. Work is progressing normally on the construction of the new plate mill at Sydney.

It does not follow that if because of the temporary inaccessibility of the Montreal market to Nova Scotian coal some apparent over-production should result in the Province itself, that any cheapening of the cost of coal is possible in Nova Scotia. Nor is it any less undesirable from the Canadian standpoint that coal production in Nova Scotia should be lessened by lack of transport facilities than it has been desirable that production should be lessened during the war period by lack of labor. The result of interrupted work by lack of cheap transportation facilities will still further increase the cost of producing coal to the operators.—F.W.G.

WOULD TAKE EXPLOSION NOW TO CAUSE STIR IN SCRAP MARKETS

THE scrap iron market may almost be said not to exist. There is no demand for scrap, no matter how low the price may be set. On some lines the quotations are at the ante-bellum figure, and whether the limit has or has not been reached is a matter of conjecture. The story is the same in every district, and seems to be without any relieving feature.

New York: Some of the yards here have given up trying, and are practically closed down. The situation seems to be that no one wants to buy scrap, and dealers are making no effort to stimulate an artificial demand by making further bargain prices. Quotations of as low as $14 f.o.b. New York have been made without resulting in a sale. Consumers profiting by their bitter experiences of last winter are pretty well stocked up and they are likely to be very canny in their movements till a better market develops for their own products.

Pittsburgh: The same situation exists in this district, of dealers trying to get a nibble by their bait of still lower

prices, and the consumers still holding off. There is absolutely no demand, and the question of price does not enter into the matter. Heavy melting steel at $18 is meeting with no better favor, while machine shop turnings and borings are a drug in the market.

Philadelphia: There is a very small demand with prices showing marked drops in some places. Several thousand tons of heavy melting steel were sold direct from producer to consumer at $16 delivered. The general price on this material is $16.50 delivered. There has been an average drop of from $1 to $3 per ton in scrap prices in the Eastern Pennsylvania market this week.

Buffalo: Taking the fact that most consumers have large stocks on hand and the almost entire absence of any demand, it may be said that the worst is yet to come. Every grade in the market has taken a further step down, amounting generally to $2 and as mills are not interested at any price, the utmost depths have not yet been sounded.

Cleveland: The feeling among scrap men here is that the market is at its lowest, and in consequence they are laying down all the material they can get. Some of this scrap may not be turned over till the distant future, though dealers expect to move most of it in the coming year. Consumers are limiting their purchases to emergency requirements, and are buying turnings at $9 to $10 per ton, and heavy melting steel at $16 and upwards.

Chicago: From week to week quotations continue to show reductions, and the end is not yet. The scrap steel and iron market is still characterized by the almost complete absence of buying. There is a quantity of 2,000 tons offered by the Chicago Milwaukee & St. Paul, 1,000 tons of this being steel rails. One feature of the small amount of buying that does exist, is that immediate delivery is always asked, showing that the purchase has been delayed till the last minute. As there are no large holdings of scrap, it is felt by some dealers that when the market does take a change it will be in the form of a sudden jump upwards.

Cincinnati: In the absence of any trading, the time of many dealers is being spent in adjusting cases of rejections of shipments which are numerous. The only grade of scrap in which any interest is being shown is stove plate, which is holding its own fairly well. At the other end of the line are steel turnings, which seem to be in less demand than any grade of scrap on the list.

St. Louis: As both buyers and sellers seem to think that the bottom of the market has not yet been reached, apathy is the prevailing state of the market. Dealers have made further reductions in quotations, but as no sales have taken place, the value of these is problematical. The slackness is occasioned more by a lack of demand than by any actual surplus of material, and this is the most hopeful feature of the situation. Railroad interests are holding all the scrap they have storage for, till prices adjust themselves upwards.

PRICE CUTTING WILL NOT HELP TO BRING OUT MORE BUSINESS

Special to CANADIAN MACHINERY

PITTSBURGH, Pa., Feb. 6.—Only a slight improvement in current bookings is reported by the steel mills, and no substantial change in the rate of buying is now expected before early spring. Last December there were some predictions that conditions in the iron and steel industry would become more active after the turn of the year, but these predictions did not carry much weight with those who study the precedents in the industry, for it is noteworthy that when business in iron and steel improves it is almost invariably in the spring, not at the turn of the year. Accordingly not much disappointment was caused by business failing to improve materially after what was called "the holiday dullness." That dullness usually occurs in an active market but if it is to be followed immediately by activity it must have been preceded by activity.

The rate of buying in finished steel products represents probably less than one-third the productive capacity. As the mills are actually operating at 60 to 70 per cent. of capacity, on an average, it is evident that the major portion of the shipments being made is against old orders. As a rule these old orders will not last much longer, and a decreasing rate of production during February, if not through March also, is expected even though buying from week to week may increase somewhat. It is more likely than not that steel production will drop below 50 per cent. of capacity. However, it must be remembered that even a 50 per cent. operation represents a very heavy tonnage as compared with outputs in the past, since capacity has increased by 40 per cent. during the war alone. A 50 per cent. operation would mean more tonnage produced than in 1906, when the industry was extremely active and the existing capacity was strained to the utmost to take care of demand, which was heavy from all quarters.

Prices Firm

Prices are firmly maintained for pig iron, unfinished steel and the regular finished steel products. This price maintenance is regarded as perfectly natural in the circumstances, and not as remarkable in any sense. There is no incentive to producers to cut prices as there is no business in sight that could be booked at a cut price and could not be booked at current quotations. Those who do buy are buying only to supply known requirements that cannot profitably be postponed, and price is hardly an object at all. The buyers pass the material long very promptly, either as jobbers to retail buyers or as manufacturers to distributors of their various wares. Purchases are only for very early delivery, generally in from two to four weeks.

Producers know quite well that when prices are so high any cutting would likely precipitate a decline, probably a very extensive one, and the game would not be worth the powder. There are certain commodities which normally fluctuate more than do the regular finished steel products, and their behaviour at this time furnishes a good illustration of the principle that when prices once start declining they go quite a distance. Iron bars are an excellent illustration. Under Government control they were set at 3.50c. Chicago and Pittsburgh adopted this price as f.o.b. their respective mills, while eastern Pennsylvania mills held that this meant 3.50c f.o.b. Pittsburgh, and added freight to destination which made 3.745c, delivered Philadelphia.

When in December the steel mills made certain precise reductions in steel products, the iron mills did not reduce. Then the Chicago mills made a reduction in the curious form of taking 2.90c Pittsburgh, as their new quotation, which meant 3.17c delivered, Chicago. It would have been easy to adhere to this price if the Chicago mills had confined their sales to nearby territory, but when they sold towards the east they were shipping "against their freight," and thus received less f.o.b. mill than if they shipped locally or westward.

Some mills actually sold in Boston at 2.90c, Pittsburgh, making the delivered price 3.20c, but this was equal to only 2.66c mill, whereas at 2.90c Pittsburgh delivery to Chicago would be 3.17c, with just a little freight deducted to get the f.o.b. mill price. The next step was naturally to sell at 2.66c or thereabouts for local delivery, which resulted in 2.70c, delivered Chicago, being done, or far below the original cut price adopted, 3.17c. The Pittsburgh and eastern Pennsylvania mills refuse to cut prices and therefore are quoting, nominally, prices that are roughly $15 to $20 a ton above the Chicago mills. Should they undertake to meet the Chicago mill quotations there would be more widespread competition.

Scrap is another illustration. Heavy melting steel scrap was so scarce, that mills paid the full Government limit of $29, delivered, and in the case of Pittsbough mills paid also the 3½ per cent. commission allowed, making the cost about $30. Now scrap is going begging at $17, delivered Pittsburgh, having slumped and slumped, and still there is no demand.

Decline in Coke

Connellsville coke is the latest illustration. It was $6.00 for furnace, under Government control, but as soon as it was announced, about January 17, that Government control would cease at the end of the month, it began to decline. Some leading operators endeavored to hold the price at $5.50, but the decline hardly halted an instant at that figure, and there have been many offerings in the past few days of good grades of

furnace coke at $5.00. A similar effort was made to hold foundry coke at $6.5., the Government limit having been $7.00, but there is foundry coke of at least fair grade available at $6.00.

These things are well understood, and the steel producers want it that when circumstances require a decline there will be a definite and precise one to some new level to which they can adhere. There is an idea quite prevalent that about April 1 some reductions along this line will occur, probably with the United States Steel Corporation taking the initiative.

Wages

The iron and steel industry has no intention of making any move whatever towards reducing its wage rates, at least for some time to come, say not before the middle of the year. The producers believe that wages in general should come down, but they feel that the cost of living should come down first. Moreover, they are not more concerned, if as much, in their own wage rates as in rates paid outside the industry. They would like to see their customers who fabricate or consume steel, not so much burdened with high wage rates, as that it interferes with the consumption of iron and steel. Then, too, the industry buys materials which are high priced on account of high wage rates, and it pays much higher freight rates than formerly, the freight advances having been caused chiefly by advancing wages on the railroads. Thus while the cost of producing finished steel is high by reason of high wages it is not simply because the steel producers themselves are paying high wages

SOME OF THE BLAST FURNACES HAVE BLOWN OUT DURING WEEK

THE main features of the pig iron market for the week just ended are curtailment of output and adjustment to present conditions.

The slack market has resulted in considerable piling of stocks, the output being reduced accordingly. Several low-phosphorous furnaces have been blown out, while others are making other grades as their orders require. Furnaces that cannot get business at the present prevailing prices face the necessity of either piling their iron, or blowing out. Production costs are at such a level that any concession in selling prices are out of the question.

Philadelphia.—The situation in the low-phosphorous industry may be said to be showing an improvement. This is being brought about chiefly by the curtailment of production, and it is estimated that the first half year's production for 1919 will not be more than half that for the corresponding period of last year. Enquiries for iron are few, and the tendency of buyers seems to be to defer their purchases. The policy of applying the $3 reduction, which has been adopted in some of the other districts, has found general favor here. It has not been granted by all sellers, some of them are taking the stand that contracts are binding, and will be strictly enforced.

New York.—Foreign enquiries are coming in, and enquiries generally are more plentiful than they have been lately. The foreign enquiries amount to about 15,000 tons. A lead has been set by a large producer in Buffalo, who has applied the base price of $31 to all contract business on his books. This has been an entirely voluntary movement on the part of the producer, and it will be interesting to see if this lead is followed to any extent by other Eastern furnaces. There are a number of domestic enquiries amounting to about 7,000 tons, deliveries to be made in some cases immediately and others spread over the first half year.

Pittsburgh.—There are rumors of decline in prices in this district, but so far there has been no change. The market has been practically quiescent this week, with sales of even small lots being far apart. The situation seems to be that the majority of consumers are pretty well provided for their first half requirements, and are not in the market for forward buying. The fact that here is a large supply of iron available for immediate delivery eliminates any anxiety they may have had about supplying sudden needs.

Buffalo.—The market here is quiet, with very small sales, and few enquiries. The sales are mostly carload lots, and the enquiries do not include any large amounts. An enquiry for 1,000 tons of foundry iron for the first half delivery is the largest thing that has transpired, and the uncertainty of the market precludes the possibility of much business developing.

Cleveland.—There has been a little more interest shown this week by enquirers, especially for first half delivery of foundry iron, but the demand for other grades is practically nil. In some cases where new orders are not sufficient to take up unsold surplus, furnaces are doing some piling, but most of the output is taken up on old contracts, and there are no cases of furnaces blowing out. Local foundry activities are showing signs of slackening off.

Chicago.—Adjustment is the order of the day in the Chicago district. Producers and consumers are getting together, the result being that the situation is adjusting itself without any serious trouble. Enquiries are few and involve only small amounts. There have been some cases where customers have asked for suspension of shipments, resulting in some iron being piled, but this is of small extent. There are rumors flying around that railways will soon be in the market for castings, and that will naturally give a fillip to foundries and react on the pig iron market.

St. Louis.—There has been a good demand for small tonnages during the week, and much satisfaction is felt over this favorable feature. A fairly large amount of foundry grade has been sold. Furnace stocks in the Southern district are almost without exception low, one concern that in the past carried up to 150,000 tons in its storage having at the present on hand not more than 6,000 tons. There is not much tendency to a reduction in prices, the uncertainty of the labor market and also the coke market being influences against any cut.

Cincinnati.—There is almost no trading going on in this district. The only sales that are being made are some of special metal, outside of that the market being dead. There has been no move made yet by Southern furnaces towards adjusting prices, but it is expected that they are waiting till present contracts expire. Some definite action will then most probably be taken.

Birmingham.—Sales are few and in small lots. The reduced price of $31 has not met with general acceptance, but large producers are selling at this figure freely. Blowing out of three furnaces and banking of several others may have a good effect on the market.

USEFUL FIREWORKS

It is not generally known that the smoke screen, which played so vital a part in the famous British naval attack on Zeebrugge, was devised by the late Commander Brock, of firework fame. The firework maker was also kept busy during the war producing flares, parachute lights, and other things for turning night into day. At first there was no means of finding out which composition or size of flare gave the most efficient light, and the Illuminating Engineering Society of Great Britain was asked by the Government to solve the problem. A new type of photometer or light-measurer was forthwith invented to give a rapid reading of the light given off at any moment by a brilliant source like a star-shell, or flare. It consists of a small tube with a tiny electric lamp inside it at one end. An opening is cut in the tube lengthways to admit a strip of metal stencilled with the letters of the alphabet. When the lamp is alight, each letter of the alphabet is illuminated in a descending scale, according to its distance down the tube. If the light, which falls on the instrument from the outside, happens to be the same as the internal illumination of any particular letter, that letter will vanish. Thus this ingenious invention provided a scale on which an observer could read off, second by second, the light provided by a flare By its use the composition of flares was improved, and the Ministry of Munitions focnd that British chemists were able to make better flares than any of those captured from the enemy. Three or four British flares, burned together, reached a brilliance of from 120,000 to 130,000 candle-power, which is equal to about 1,000 arc lamps.

Take 10-Year Period to Absorb War Machinery

Serious Problem is Facing Many of the American Firms That Have Large Amounts of Money Tied Up in Their Equipment— Use Some Material in the Training Schools

Special to CANADIAN MACHINERY

CLEVELAND, O., Feb. 5.—The sudden cancellation of war contracts by the U. S. Government, and the attitude taken that many of the contracts for machinery necessary in their execution are invalid, because they did not pass in regular form through the office intended for that purpose, is causing much uneasiness among American manufacturers. Millions of dollars of industrial capital is tied up in this way in material and machinery, and should the Government not recognize the justice of the claims, the result, it is declared, will be nothing short of disastrous to many firms.

Manufacturers point out that they placed themselves unreservedly at the service of their Government. They were subject to somewhat peremptory treatment by its officers, all of whom were apparently authorized to demand whatever was required in the way of machinery, and material of all kinds was accumulated in order that production might not be hampered. In short, everybody responded in a patriotic way to the imperative call for munitions.

When the armistice was signed, war work suddenly ceased. There was a deluge of cancellations on machinery orders. The situation looked serious, but manufacturers asked each other, "Shall we accept these cancellations, or shall we protest?" They held conferences. Coupled with the cancellation problem was the other equally as serious as to the best plan by which the market could be made to absorb this surplus machinery—this Government equipment it was called — without disturbing industrial conditions, without, eventually, causing much unemployment and uneasiness.

Different Proposals Made

Several plans are being considered. One suggestion is that the manufacturers repurchase their machinery at a discount of 10 per cent. This was not altogether favored, because the trend of prices and materials indicated that even allowing for the discount, manufacturers were likely to lose heavily. The proposal that the manufacturers handle the machinery for the Government, filling orders on a 50-50 basis, that is, one-half from the Government's stock and one-half from the manufacturers' production, has been considered, but here, too, some manufacturers disapprove of a competition which, in a dull market would handicap their independent enterprise. "Better," said one, "to take the machinery and dump it in the ocean and then forget about it."

The plan which appears to meet with some approval, is that the Government should distribute the sales of this machinery over a period, say, of five, or even ten years, so that the market might absorb it very gradually without hindrance to industry in general. The Government, it is also pointed out, might use much of this machinery in the equipment of national schools for the education of apprentices, for an adequate supply of skilled workers is an absolute necessity, and one which, at the present time, does not seem to be anybody's business, that is on a scale calculated to meet the requirements of industrial development.

Various Classifications

A recent bulletin issued from the office of the War Service Executive Committee would indicate that manufacturers and the Government are getting together on the disposal of war-time tools by the War Department. Four clauses are of interest:

1. The inventory of all machines and equipment will be expedited to the greatest possible extent.

2. As soon as it is known that a quantity of machine tools is available for disposition the manufacturer of these tools will be given an opportunity to purchase them at a price, and the terms of settlement will be satisfactory to all parties concerned.

3. In case it is impossible for a manufacturer to purchase his product outright, an effort will be made to arrange for marketing the product by the manufacturer in an equitable manner, securing for the Government and manufacturers alike the best possible terms.

4. In case both these methods of disposition fail, the material will be offered for sale to the general public in the manner prescribed by law.

How the Trade Feels

The following letter issued "to customers," indicates pretty generally the attitude of American manufacturers with reference to the cancellation problem:

"To Our Customers:—

"The recent cancelling of many Government contracts has impelled some of our customers to request us to cancel their orders for machines and tools which were intended for use on Government contracts.

"While we are perfectly willing to suspend operations on these orders, under present conditions we would not be inclined to accept outright cancellations for any of the machines on order pending investigation as to what action the Government may take with reference to orders on hand.

"While the acceptance of any one individual cancellation would not prove embarrassing, the acceptance of cancellations of all orders intended for war use would, as that would practically embrace all work in process by machine tool builders to-day (this letter was written toward the end of November, 1918). A wholesale cancellation of orders would seriously disorganize, if not temporarily overwhelm American industries. For this reason, and to be entirely fair with all our customers, we felt it necessary to adopt a uniform ruling on these requests and to outline to our customers what action we think it is proper to take at this time.

"American manufacturers have responded patriotically to the call of the Government for increased production to supply war requirements. It has been a people's war, and the benefits of victory are shared by all alike. We are all merely the instrument of the people in providing the sinews of war, and the cessation of hostilities does not relieve the people as a whole of these obligations. The manufacturers should not be expected to stand the burden alone of holding capital invested in abnormal stocks produced at abnormal prices, but the burden should be distributed to the American people. It is not an individual proposition. It is a national one and should be so considered.

"We feel that the Government would not recognize us direct in this matter, as these orders for machines were not placed by the Government, but by Government contractors. We suggest a charge covering accrued cost on your work and in case of a declining market value a certain percentage on the cost or abnormal value entering into the machines. If, however, prices of material and labor are stabilized at the present level, no such charge covering shrinkage will be justifiable. We feel that this possible shrinkage in value is an important element in the cost. Our charge covering this would be included by our customer in his memorandum of costs to the Government as part of his preliminary expense incurred in getting ready for handling his contract, together with his costs for actual work performed. In this way the entire charge would be passed on to the Government and absorbed by it, which as we see it is the logical place for it to be taken care of.

"We have perfect confidence that the Government intends to deal justly and fairly by American manufacturers, and that no serious loss to anyone will be involved.

"We believe that our customers will grant that this is a perfectly logical and just position to take and that our situation will be fully appreciated."

A Serious Problem

The invalidation of contracts entered into in good faith does not, in the opinion of manufacturers, indicate a due appreciation by the Government of the industrial or even the financial situation. To lose the money which these orders represent means that industry will be seriously curtailed; there will be much

unemployment, and that the forthcoming Liberty Loan may meet with slim response.

Said one manufacturer to CANADIAN MACHINERY, "When one considers the matter in all its seriousness, he is justified in feeling that a volcano is gathering force for explosion. A crisis is imminent. It can be handled tactfully so as to stabilize conditions, and give to the men who have fought for us a helping hand instead of a cold shoulder. Or it can be bungled in such a way as to bring about something like the undesirable conditions existing to-day in some European countries The American manufacturer is always willing to cooperate in the interests of his country, but I'm beginning to feel that Mr. Wilson might better be on the job at home. I like the way the Canadian Munitions Board has handled this matter. They have intimated to the Washington authorities in positive manner that contracts entered into in good faith must be settled, and I understand adjustments are now being made."

The feeling seems to be that the Government cannot afford to ignore these claims, but that in the meantime some proportion of the funds tied up should be released to assist in the development of peace-time industry.

TAR VARNISH FOR IRON-WORK.

Heat about 100 gal. of tar to a low boiling point, and add 100 lb. of fresh slaked lime sifted over the top and then worked down. Boil this mixture until it becomes pasty. Let it settle for a few minutes and then add 20 lb. of tallow and 5 lb. of powdered resin. Stir until thoroughly mixed and all ingredients dissolved; then allow to cool. The mixture should not be raised to a higher temperature than 100 deg. Fahr. Should the preparation be too thick it can be thinned down with paraffin or naphtha.

This is said to give a finish like stove enamel. At a works situated near the edge of the sea, the south-east winds eat away iron work very quickly. All gas holders and galvanized iron roofs and galvanized sides of buildings are painted two coats with this tar varnish and then whitewashed thoroughly, protecting them from the weather and salt air. The varnish is elastic and will stop corrosion.

ALUMINIUM ALLOYS.

Aluminium was merely a scientific curiosity a generation ago, the production in 1883 having been but 83 lb.; but it is now one of the most common metals in use, with an annual production of hundreds of thousands of tons. It is most important in its alloys, especially in those with magnesium and copper. The alloy known as magnalium is a series of mixtures containing 10 to 30 per cent. of magnesium; it is silver-white in appearance, strong, ductile, easily cast, takes a fine polish, and has a specific gravity of only 2 to 2.5, somewhat less than that of aluminium itself. With 10 per cent. of magnesium the melting point is between 650 deg. and 750 deg. C. The metal is made harder, more brittle and finer in polish with additions of magnesium up to the practical limit of 30 per cent.; it may be given a dark color by maceration, or it may be nickeled or gilded. Duralumin, with 3.5 to 5.5 per cent. of copper and about 0.5 per cent. each of magnesium and manganese, has greater hardness, tensile strength and ductility than any other aluminium alloy. It takes a high polish and may be easily hardened, but it is given special value by its resistance to the action of sea water, and dilute acids. It is a little heavier than aluminium with a specific gravity of about 2.8. Other alloys similar to magnalium, but adapted to special uses, contain small percentages of nickel, tin, lead and iron.—M.M.

SELF-LUMINOUS PAINTS IN WAR AND PEACE

Self-luminous paints were largely used during the war for the dials of watches and instruments, for trench signs, for buoys, and many other purposes. Very little was known of the best composition of such paints and the best way of using them until Professor Clinton of University College, London, and Mr. J. H. Dow, of the Illuminating Engineering Society of Great Britain, carried out tests with special forms of electric glow-lamp photometer. They used paints made of radium bromide and zinc sulphide, which at first show a quick rise in the light given off, followed by a slow decay. They found that if more than a certain minute proportion of radium was used, the light fell away so rapidly that no advantage was gained. They also found that the same thing happened if the paint was laid on too thickly. Owing to the high cost of radium, these results enabled big savings to be affected in the expenditure on self-luminous paints during the war. They will be no less valuable in peace, when the use of these paints is developed for the illumination of instrument dials, electric switches, signs and sign posts, buoys, and other things, where it is desirable to provide permanent visibility.

Current Events in Photograph

BLINDED SOLDIERS GETTING BACK TO WORK

The photo shows how broom-making is carried on at the Men's Industrial School, Canadian National Institute for the Blind, King St. west, Toronto. Thirteen men are being taught this work at the school, and the Institute finds employment for them after they have become sufficiently p r o ficient. The man in the centre of the group of three has been blind since he was three years old. One of the things which strikes visitors to the Institute is the cheerfulness of t h e blind workers at all times.

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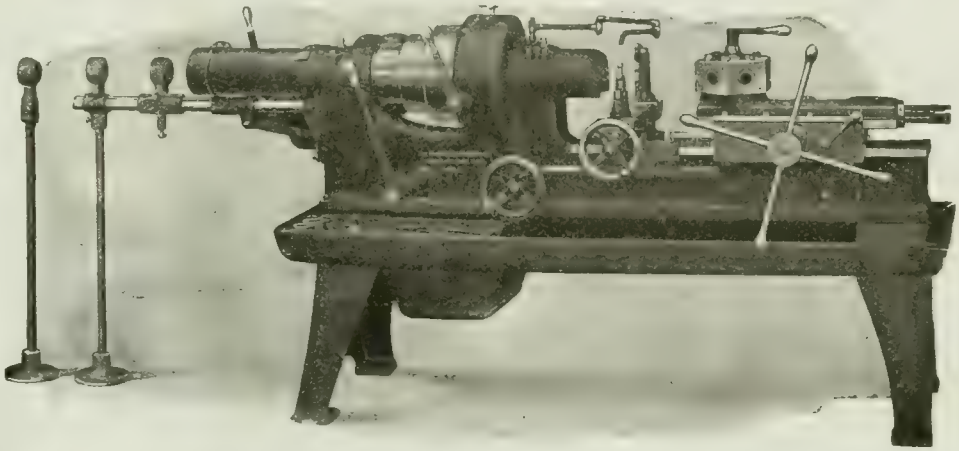

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(1)

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$31 40
Lake Superior, charcoal, Chicago	38 85
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	33 60
Basic, Valley furnace	30 00

Government prices

	Montreal	Toronto
Hamilton		.....
Victoria		50 00

IRON AND STEEL

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	$ 4 75
Steel bars, base, Toronto	5 00
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	4 55
Steel bars, base, Montreal	5 05
Reinforcing bars, base	4 50
Steel hoops	7 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	5 05
Chequered floor plate, 3-16 in.	12 20
Chequered floor plate, ¼ in.	12 00
Staybolt iron	11 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 70
Tank plates, Pittsburgh	3 00
Structural shapes, Pittsburgh	2 80
Steel hoops, Pittsburgh	3 30

F.O.B., Toronto Warehouse

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	4 10
Structural shapes	4 20
Plates	4 45

FREIGHT RATES

Pittsburgh to Following Points

Per 100 lbs

	C.L.	L.C.L.
Montreal	29	39½
St. John, N.B.	47½	63
Halifax	49	64½
Toronto	23½	27½
Guelph	23½	27½
London	23½	27½
Windsor	23½	27½
Winnipeg	81	106½

METALS

Lake copper	$26 00	$ 25 00
Electro copper	26 00	25 00
Castings, copper	25 00	21 00
Tin	70 00	65 00
Spelter	9 50	9 00
Lead	8 50	7 25
Antimony	10 00	10 00
Aluminum	40 00	40 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 7 00	$ 6 25
Plates, 3-16 in.	8 50	6 00

Per 100 lbs.

Per ton

Price List No. 38

Standard Buttweld

Per 100 feet

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

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Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 45%.
4½" and larger, 40%
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL

Dealers' Buying Prices.

Per 100 Pounds

	Montreal	Toronto
Copper, light	$15 00	$13 00
Copper, crucible	19 50	15 00
Copper, heavy	18 50	15 00
Copper, wire	18 50	15 00
No. 1 machine composition	18 00	14 00
New brass cuttings	10 00	10 00
Red brass turnings	13 00	10 00
Yellow brass turnings	9 00	8 00
Light brass	7 00	7 50
Medium brass	9 00	9 00
Scrap zinc	5½-6	5 00
Heavy lead	5½	8 00
Tea lead	4½	3 50
Aluminum	18 00	18 00

Per Ton

Heavy melting steel	15 00	15 00
Shell turnings	9 00	8 00
Boiler plate	16 00	15 00
Axles (wrought iron)	38 00	15 00
Rails	20 00	15 00
No. 1 machine cast iron	28 00	18 00
Malleable scrap	23 00	15 00
Pipe wrought	16 00	8 00
Car wheels	25-30	18 00
Steel axles	34 00	20 00
Mach. shop turnings	9 00	6 00
Stove plate	16 00	14 00
Cast boring	11 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅝" and less	10
Carriage bolts, 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Elevator bolts	5
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex., blank	add 1 75
Nuts, hex., tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only, list plus	50
Iron rivets and burrs	25
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	37½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R., bronze	25

MILLED PRODUCTS

	Per Cent
Set screws	25
Sq. & Hex. Head Cap Screws	20
Rd. & Fil. Head Cap Screws	net
Flat But. Hd. Cap Screws	plus net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. & Semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	plus 10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1½ in.	add $4 50
Cold pressed nuts over 1½ in.	add 7 00

BILLETS

Per gross ton

BILLETS

Bessemer billets	$43 50
Open-hearth Billets	43 50
O.H. sheet bars	47 00
Forging billets	56 00
Wire rods	57 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$5 50	$5 30
Cut nails	5 85	5 65
Miscellaneous wire nails		60%
Spikes, ⅜ in. and larger		$7 50
Spikes, ¼ and 5-16 in.		8 00

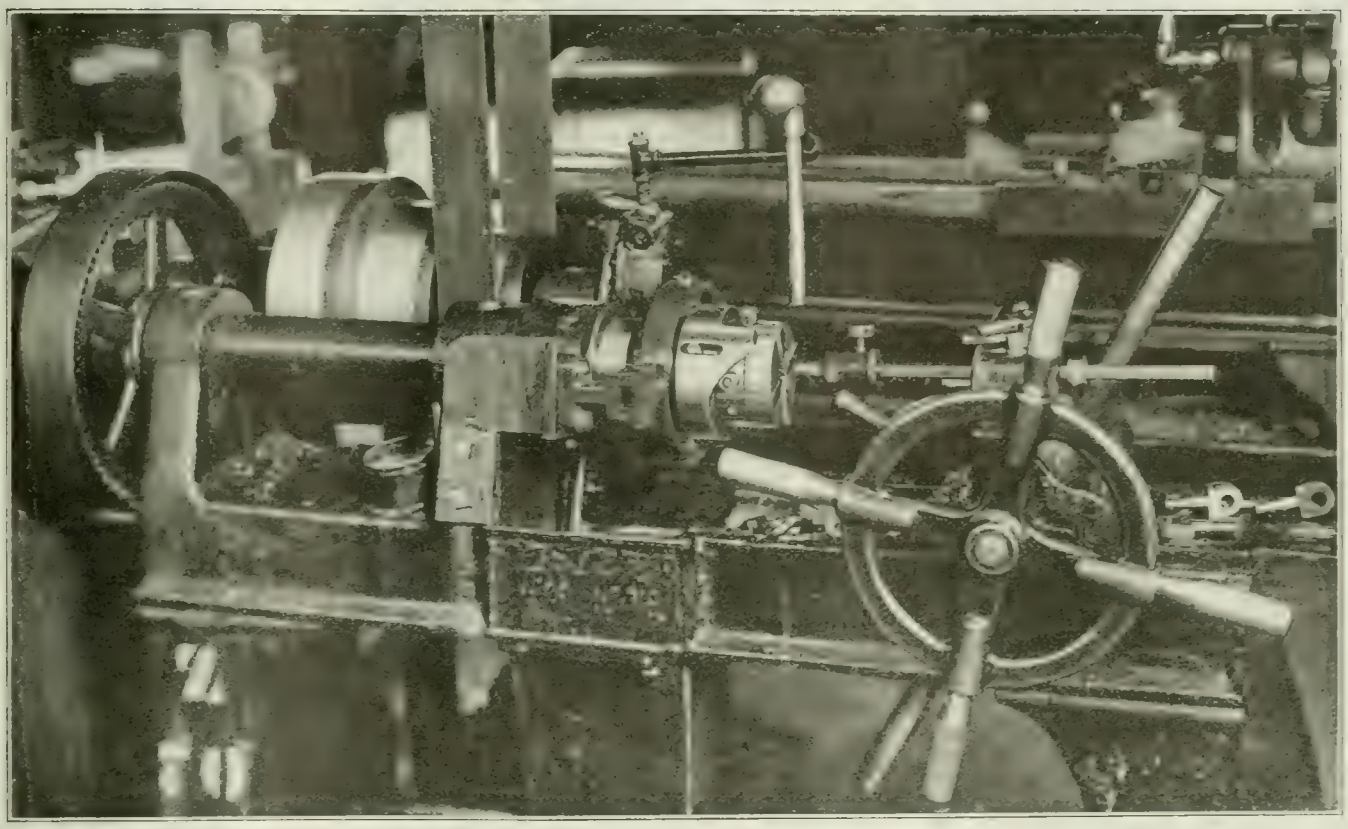
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

BROUGHT UP TO DATE



This old Bolt Cutter has been turned into an up-to-date Threading Machine by the application of a Geometric Die Head.

The Connecticut Telephone Company removed from this Bolt Cutter the solid die head with which it was equipped, and put in its place a Geometric Self-opening Die Head of the type regularly furnished on the Geometric Threading Machine.

Thread is 7-16" diameter, 14 U.S.S., about 1" long, on switchboard terminals of a high class copper casting.

The best part of it is, that besides getting clean, sharp threads, they have increased the work about six times over what was being accomplished with a solid die head.

Has any threading operation been given the right chance unless a Geometric figures in it?

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal.
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	0 43
Solder, guaranteed	0 45
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 16
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls.,gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster of Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	list plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

	Per Cent.
S.S. drills, wire sizes up to 52	35
S.S. drills, wire sizes, No. 53 to 80	40
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	40
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks...list plus	40
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	75
High speed cutters, list plus	40

COLD ROLLED SHAFTING

At mill	list plus 40%
At warehouse	list plus 60%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 8 00	$ 7 00
Sheets, black, No. 10	8 00	6 90
Canada plates, dull, 52 sheets	9 00	8 10
Can. plates, all bright.	9 50	9 50
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head, 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	8 20
Premier, 10¾ oz.	.....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; ⅝ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS.

	Per cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	32½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	$32 00	$.....
1¼ in.	36 00	.....
1½ in.	39 00	32 00
1¾ in.	39 00	32 00
2 in.	45 00	32 00
2¼ in.	48 00	34 00
2½ in.	50 00	40 50
3 in.	58 00	45 00
3¼ in.	.....	52 00
3½ in.	70 00	54 00
4 in.	80 00	67 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal, bulk	18½
Palacine	21½
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	49½
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	13½

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30%
Standard	30,10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES.

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices Per Lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS.

Brass rods, base ½ in. to 1 in. rod	**0 38**
Brass sheets, 24 gauge and heavier, base	**0 43**
Brass tubing, seamless	**0 46**
Copper tubing, seamless	0 48

WASTE.

White. Cts. per lb.

XXX Extra	20	Atlas	18½
Peerless	21	X Empire	17¼
Grand	19¾	Ideal	17¼
Superior	19¾	X press	16
X L C R	18½		

Colored.

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing.

Arrow	25	Anvil	16
Axle	20	Anchor	11

Washed Wipers.

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard ... 10% Best grades .. 15%

ANODES.

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	42 50	43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers,' in sheets, 6x4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$13 25	$13 25
Sheets, 3½ lbs. sq. ft.	13 25	13 25
Sheets, 4 to 6 lbs. sq. ft.	12 50	12 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

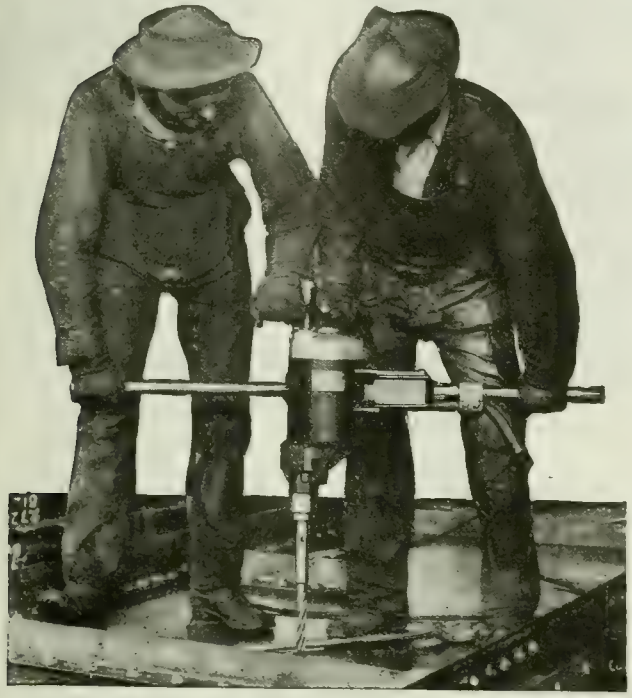
Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	...
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

These Men

know how time is saved by

Aikenhead's



Van Dorn Portable Electric Drills

They know, as only men who have worked with Van Dorn Drills can know, the all-round serviceability of Portable Electric Drills that are both fool-proof and weather-proof.

Van Dorn Electric Drills go to the work wherever it is. They drill neat, clean holes 50% faster than the best pneumatic drills. If you have holes to drill in wood, steel, any metal—Van Dorn Electric Drills can drill them for you at lessened cost. Here is their

Capacity in Solid Steel

DAOOO	3-16 in.
DAOO	¼ in.
DAOOX	5-16 in.
DAO	⅜ in.
DA1	½ in.
DA1X	⅞ in.
DA2	1 in.

Write for catalog

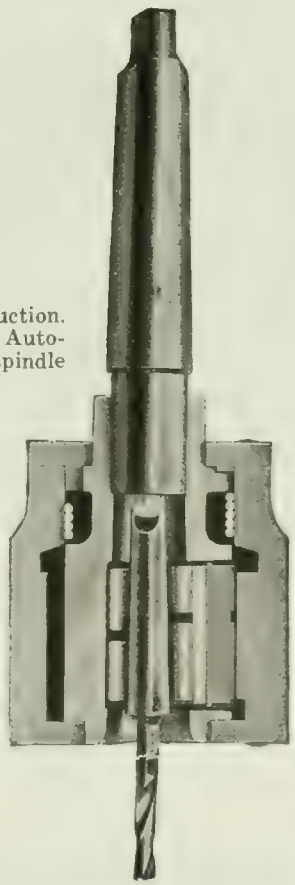
Aikenhead Hardware Limited

17 Temperance St. **TORONTO**

Aikenhead's

Wahlstrom Chuck

Is one of the best helps you could have toward greater and more economical production. With an ordinary chuck, minutes are required to change tools. With this Wahlstrom Automatic Chuck, one tool is removed and another is inserted in two seconds, and the spindle never stops.



50% GREATER PRODUCTION

has been obtained in many shops since the fitting of drill presses with Wahlstrom Chucks.

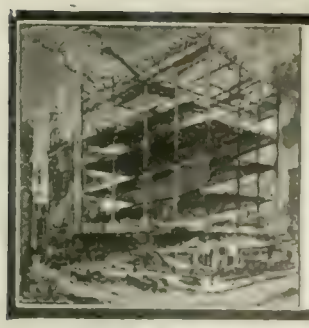
This Chuck automatically centres the tool. It grips by the entire shank, enabling you to use broken tang tools as well as perfect tools.

As resistance on the tool increases the jaws of this Wahlstrom Chuck grip more firmly. The cam action is such that slippage is impossible.

Write for booklet.

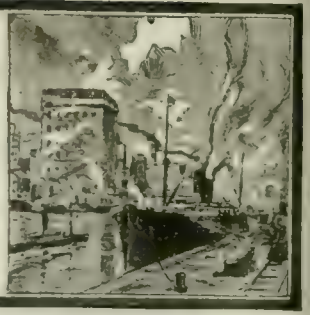
Aikenhead Hardware Limited

17 Temperance St **TORONTO**



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES



ENGINEERING

Montreal.—At a recent meeting of the Montreal branch of the Engineering Institute of Canada it was announced that the annual meeting of the association would be held at Ottawa on the 17th of this month. Following the business session, a professional meeting will be held during the two following days.

Vancouver, B.C.—The British Columbia Electric Railway Co. has made an agreement with the Harbor Board, granting the company exclusive light and power rights for a period of ten years on Industrial Island. The Western Power Company of Canada wants to connect up with the wire nail company's new plant on the island, but is prohibited from doing so.

Windsor, Ont.—A branch of the Engineering Institute of Canada was organized here recently. The meeting was held in the offices of J. J. Stevens in the Heinuzman building. Mr. Stevens was elected chairman, and gave a short speech setting forth the objects and ideals of the society. The organization of this branch follows closely on the organization of a branch at the Soo.

Montreal.—The early future requirements of the City of Montreal in regard to the additional demand for water supply has been brought to the notice of the officials and residents of the city by the announcement of the City Engineer to the effect that he is about to ask for tenders for the construction of a conduit, which, when completed, will supply the city with 20,000,000 gallons of water per day additional.

Owen Sound, Ont.—The Grand Trunk are going to build a new steel bridge over the Pottowatamie River at the Grand Trunk crossing very shortly. This is necessitated by the introduction of heavier engines on the route, which are beyond the capacity of the old bridge. The new bridge will occupy the same site as the old one, and more piles are being driven and the foundations strengthened in preparation. It is said that other bridges along the route are to be treated similarly, and that the introduction of heavier engines and faster trains will tend to give real competition to the C. P. R.

Toronto.—The programme of the Toronto Harbor Board, as outlined by E. L. Cousins, chief engineer and manager, has as one of its most important items, the reclamation of ninety acres at the eastern end of the harbor. In the present year the board hopes to complete about $2,000,000 worth of the work. If the Dominion Government gives its approval, and the bonds are sold, the turning basin at the eastern end of the ship channel in the Ashbridge area will be constructed this year. There is also included work on the breakwater between Bathurst street and the Humber, and a section of the inner harbor near Spadina avenue.

Montreal.—Mr. Justice McLennan recently gave judgment limiting the liability of the Sincennes McNaughton line. This was in a case in which the court had previously held the company liable in damages to Lawrence C. Giff et al. The plaintiff company, owners of the tug "Virginia," sought to have its liability limited for damages resulting from the grounding of the canal boat Lawrence C. Giff and the barge "Lemay," the damage having been held by the previous court to have been caused by the negligence of the master of the tug. Justice McLennan held that the company was entitled to have its liability limited to $38.92 for each ton of the tug's tonnage.

Montreal.—In co-operation with the Administering Commission, a Housing Committee of the citizens of Montreal are preparing plans for a gigantic housing scheme to be carried on during the present year in the City of Montreal. It is anticipated that approximately $5,000,000 will be expended on this enterprise. The plan, if it goes through in its entirety, will be operated in connection with the Federal grant of $25,000,000, announced some time ago, to assist municipalities and cities throughout the Dominion in housing schemes that they may devise. Hopes are entertained that the Government will state their ruling in regard to this scheme as early as possible in order that a start may be made as soon as possible.

MARINE

Vladivostok.—The "War Charger," from Victoria, B.C., has arrived here with a full cargo. The "War Charger" is one of the vessels built on the Pacific Coast at Vancouver by the Wallace yards.

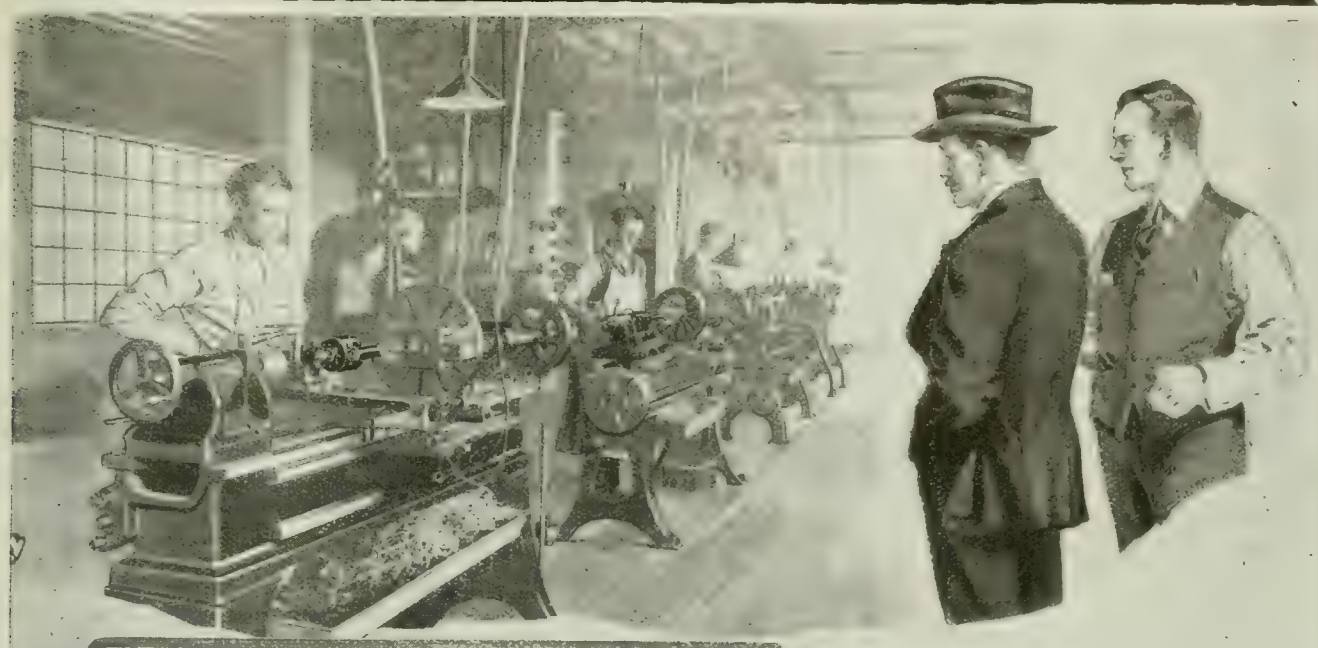
Vancouver, B.C.—It is understood here that the Canadian Pacific Railway contemplate making some improvements to their terminals here. A new ocean pier will be constructed, and the necessary studies of the site are now being made, after which, the work of dredging and filling will be immediately started.

Victoria.—Since the Canadian Government placed the extensive orders for the fleet of vessels that are to compose the National Merchant Marine, the Imperial Munitions Board have ceased letting orders for wooden boats, and the forty-seven that were under construction will soon be completed, which will conclude the operations in this line. The last of these wooden vessels is scheduled to leave British Columbia about the middle of the present month, sailing via Panama, with a cargo of lumber.

London, Eng.—In an interview given at Liverpool by Mr. Hannevig, of New York, president of the Dominion Shipbuilding Co., of Toronto., he gave expression to very adverse opinions relative to the U. S. shipbuilding programme. The American shipbuilding programme had become an orgy of extravagance and miscalculation, and the cost of building has become so high that the freight rates can never justify them. The United States would be unable to compete with Great Britain in the building and operating of ships.

Vancouver.—Speaking at Vancouver recently, C. A. Whitelock, manager of the Cunard Steamship Company, Ltd., said he thought there was a great future for the ports of Victoria and Vancouver. A large number of the lines now operating on the Atlantic would, he thought, ultimately turn to the trans-Pacific field. The conclusion of the war had resulted in great many enquiries for passage across the Atlantic, said Mr. Whitelock, and the modification of the passport regulations had brought about a revival in the Atlantic passenger trade.

Victoria.—The car ferry "Canora," built in Quebec, arrived recently after her long voyage to the coast, and was drydocked for cleaning, etc., before being put in commission. The general manager of the Western lines of the Canadian National Railways, Mr. A. E. Warren, said she would be put into commission as soon as she came out of the dock. She will be used between the terminus at Patricia Bay, on Vancouver Island and the mainland, but he was not prepared to say at what particular point of the mainland she would be located. Port Mann was originally selected, but



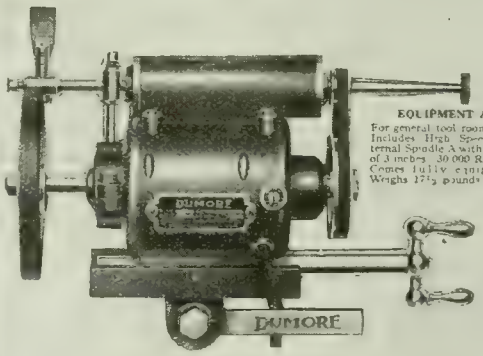
"Limits of .0001 are Easily Maintained with DUMORE Grinders"

IN selecting a grinding tool for your shop, consider the merits in the light of two all-important mechanical principles—**speed** and **balance.** The fact that small emery wheels will not cut properly unless driven at high speeds has been established beyond question. But with high speeds there must be perfect running balance **(dynamic).** Accuracy can be obtained only when chatter, taper and bell-mouth are eliminated.

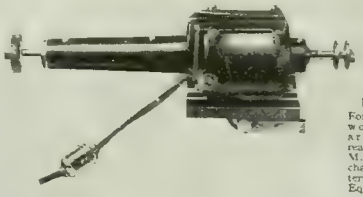
The **DUMORE** grinder is mechanically perfect because these two great principles are incorporated in its construction. Speeds ranging from 10,000 to 50,000 R. P. M., combined with dynamic balance, insure accuracy to .0001. Then, too, the **DUMORE** is portable—easily carried to all parts of the shop and quickly set up ready for work. Its constant use and endorsement by thousands of mechanics is highest proof of its value.

Efficient, economical production is largely a matter of standardizing on parts. This, of course, means making dies, jigs and gages. Here is where a **DUMORE** grinder in your shop will solve your problems. Your dealer will be glad to demonstrate it and give you further information.

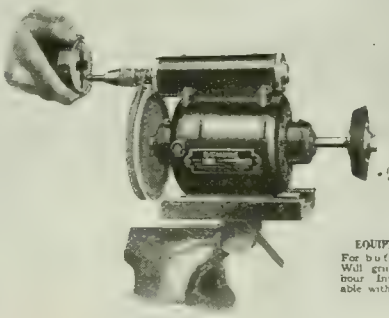
WISCONSIN ELECTRIC CO.
508 Sixteenth St. RACINE, WIS.



EQUIPMENT A
For general tool room work. Includes High Speed Internal Spindle A with reach of 3 inches. 30,000 R.P.M. Comes fully equipped. Weighs 12½ pounds.



EQUIPMENT B
For deep internal work. Extension arm has 10-inch reach. 10,000 R.P.M. Arm is interchangeable with internal spindle on Equipment A.



EQUIPMENT C
For button dies. Will grind 20 at an hour. Interchangeable with A and B.

DUMORE HIGH SPEED GRINDERS

it is likely now that another point will be selected.

Ottawa.—It is interesting to note that the judge, who had the investigating of the charges of bad accommodation and feeding on the "Northland," states that he took particular care to find out if the newspaper reports of the men's statements were strictly according to fact. After painstaking enquiries he came to the conclusion that the reporters had faithfully recounted the stories as told them by the men themselves, and where anything that looked like a misstatement had occurred, it was due to the confusion existing in the excited state of the men, who expressed themselves in terms which did not convey the meaning that they afterwards claimed to have wished to express.

Quebec.—All St. Lawrence ports are watching the voyage of the "Canadian Voyageur" down the river and Gulf with the deepest interest. This mid-winter voyage is something so far out of the ordinary that it could not help but be fruitful of speculation. The old-timers hail it as a verification of their oft-repeated prophecy that winter navigation of the Gulf of St. Lawrence was perfectly feasible, and they now look upon the problem as being solved. However, one swallow does not make a summer, and one successful winter voyage does not make a winter route. It will take a considerable number of winter voyages down the Gulf of St. Lawrence to induce the underwriters to lower their rates.

Montreal.—Some interesting figures are given relating to the Canadian Pacific Ocean Services. From the outbreak till October 30, 1918, the steamers of the company carried a total of 1,041,000 passengers, both military and civilian, between ports all over the world. The ports included Chinese and Japanese coasts, Singapore, Bombay, Mesopotamia, Suez, Gallipoli, as well as North and South America west coast ports, Canadian and United States ports on both coasts, South African and Indian Ocean ports. The total loss of troops has been eight in number due to enemy action. Over 4,000,000 tons of cargo and munitions of war have been carried. The company lost the Calgarian, Hesperian, Missanabie and Ionian.

PERSONAL

Ronald G. Starr, B.A.Sc., of Toronto, has been appointed engineer of the Orillia electrical and water works plants, in succession to the late W. K. Greenwood. For the past two years Mr. Starr has been with the Moloney Electric Company. There were a large number of applicants for the position, which carries a salary of $2,400 per annum.

TENDERS

Pembroke.—Tenders are being called for by the Town of Pembroke, for furnishing and installing a waterworks pumping unit, comprising turbine pump of 2,000 gallons capacity against 300 feet head, and steam turbine or gasoline engine direct connected to pump. Full particulars may be obtained from the office of the Town Engineer, or at the office of Chipman & Power, Main Building, Toronto.

Edmonton, Alberta.—Tenders are being called for the T. B. Sanitarium, Alberta. The tenders are for the construction of Administration Service Infirmary buildings, three pavilions, power house, and tunnels near Keith Station, Alberta. Full particulars can be obtained from the Minister of Municipal Affairs, Parliament Buildings, Edmonton, Alberta, and the office of the Department of Soldiers' Civil Re-establishment, Engineering Branch, 407 Beveridge Building, Calgary, Alberta.

Ottawa.—Sealed tenders will be received up to noon of Thursday, February 20, 1919, for the purchase of naval vessels lying at Halifax, Sydney, and Liverpool, including : Steam trawlers —Length 125 ft. B. P. Breadth moulded, 23 ft. 4 in. Moulded depth 13 ft. 6 in. Steam Drifters—Length 90 ft. Breadth 19 ft., 3 in. Depth hold, 10 ft. 6 Patrol Vessels—Length 140 ft. Breadth, 23 ft. 6 in. Depth hold, 13 ft. 6 in. 4 Steam Fishing Vessels—Ranging in length from 130 ft. to 170 ft. Breadth 22 ft. 3 in. to 24 ft. Depth 8 ft. 8 in. to 9 ft. 6 in. Several small Steamers—of various dimensions, and motor launches of various types.

TRADE GOSSIP

Oil Found at Peace River.—A company drilling for oil near Peace River crossing reports striking oil at a depth of 1,120 feet. At 1,090 feet heavy impregnated sandy shale was encountered, and thirty feet lower, oil of apparent high gravity was found. This is said to be the fourth strike in this district.

Establishes Branch on the Coast.—L'Air Liquide Societe of Montreal is going to establish a branch at Vancouver. The company manufacture oxygen and carbide for oxy-acetylene welding purposes, and supply complete outfits, with instructors, to customers. A building permit has been issued by the building inspector for a $25,000 factory.

Fire at British Chemical Co.—The large storehouse of the British Chemical Co. at Trenton has been destroyed by fire. The contents were a total loss, and the value of building and contents is estimated at $200,000. A large quantity of stores, cotton, fire hose, locks, hardware, etc., were in the storehouse and were completely destroyed.

Electric Steel Industry.—There have been a large number of installations of electric furnaces in England. Probably one-half of these are located in the Midlands, in the Sheffield and Rotherham districts. Up to the end of 1917 there had been 140 of these furnaces installed, the heavy demands of the shipbuilding and armament industries probably having a large influence in their adoption.

The Automobile Trade.—The Montreal Automobile Association have decided to have individual exhibitions in all the private showrooms about the city, in place of the general show hold in previous years. The proposed plan is the result of the inability of the association to secure the Craig street drill hall for their usual exhibition, and the fact that no other convenient place is available.

The Lyons Fair.—The Russian steamer "Volonga" sailed from St. John, N.B. just recently with a cargo of exhibits of Canadian manufacture for the international fair at Lyons. This will be the first time that Canada has been represented at the Lyons Fair, but she will be well represented. No less than fifty five prominent Canadian manufacturers have sent samples of their products to be shown, and the total exhibits occupy a space of 30,000 cubic feet.

Cement Plant Wants Power.—The power plant formerly used by the Canada Cement Company at Port Colborne was taken last January by the Union Carbide Company. The latter company was compelled to close down a short time ago due to shortage of power, forcing 200 employees out of work. The Cement Company has orders sufficient to keep them busy for the whole of the ensuing season, chiefly on work for the contractors on the Welland Ship Canal, but they are prevented from starting owing to the lack of power.

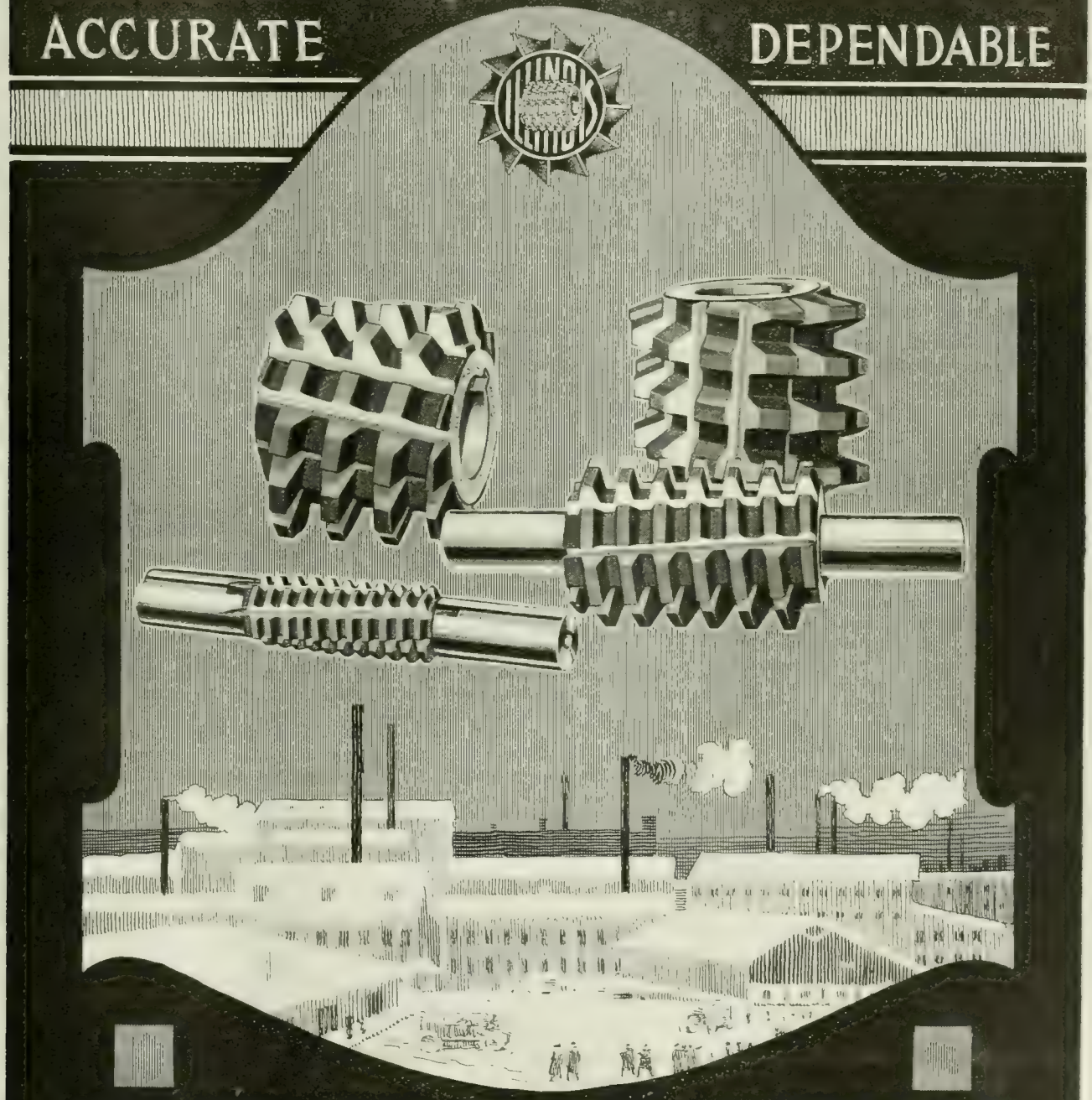
Moving to Ingersoll.—The Port Hope File Manufacturing Company, Limited, has been purchased by interests in Ingersoll, who will immediately move the plant to Ingersoll, operating it under the name of "Ingersoll File Company, Limited." The whole north portion of the Noxon plant in Ingersoll has been taken, and is being equipped with additional up-to-date file machinery. The capacity will be very much greater than it was with the old company. The operating organization is the same as that of the Port Hope File Manufacturing Company, Limited.

Lumbermen Meet.—Between 50 and 60 of the members of the Canadian Forestry Association, who recently attended a convention at the Windsor and Ritz-Carlton Hotels, Montreal, are now in St. John, N.B., attending the convention of the Canadian Lumbermen's Association At this convention there will be a number of discussions on export trade and other matters affecting the lumber trade. Among those attending the convention are: A. J. Price, G. W. Grier, T. W. Mason and Alex. MacLaurin, of Montreal; Messrs. Bolton and Slaton, Quebec; W. E. Bigwood, A. C. Manbert, A. E. Clark, J. G. Cane and W. E. Laidlaw, of Toronto; William Ross and C. R. Bremner, of Ottawa.

Work at Ojibway.—Much speculation has been indulged in at various times about the plans of the United States Steel Corporation in connection with the erection of their Canadian plant at Ojibway, Ontario. The construction of this plant was held up by the war, and

ILLINOIS HOBS

ACCURATE DEPENDABLE



ILLINOIS TOOL WORKS
CHICAGO

Detroit Store, 997 Woodward Avenue. Represented by Lewis G. Henes, Monadnock Building, San Francisco and Title Insurance Building, Los Angeles

has been proceeding on a comparatively small scale so as not to interfere with war endeavor. There is little doubt but that construction in a large way will be entered upon as soon as conditions will permit. It is not thought that the enlarged programme will eventuate in 1919, judging from the present outlook, but more men will probably be employed in preparing the site than was the case during the war. A great deal of money has already been expended in underground work, such as the laying of drains, sewers, etc. Several miles of roadway have been laid out in the townsite. The docks are well towards completion, and they will be among the most modern on the continent. The most improved labor-saving devices for handling iron ore and coal will be introduced. Foundations are being laid for four blast furnaces, and others will be built as circumstances make advisable. Four years would be required to complete the plant if construction work were to be speeded up immediately. Since the officials do not intend to hasten the building of the plant, the date of completion would appear to be thrust forward still further into the future.

WANT A BOUNTY ON IRON ORE MINED

Deputation At Ottawa Asks That This Encouragement Should Be Given

Ottawa.—In support of a movement to encourage the mining of iron in Canada, representatives of the Boards of Trade of Port Arthur, Sudbury, Sault Ste. Marie, North Bay, Vancouver, and other cities and towns, waited on Sir Thomas White, acting Premier, and other members of the Government. The delegation will be introduced by Mr. F. H. Keefer, M.P., Parliamentary Under-Secretary of State for External Affairs.

The deputation will suggest that one dollar shall be paid for every dollar's worth of iron ore produced in Canadian mines. When iron and steel bounties were paid on the tonnage of pig iron produced in Canada, members of the deputation state, the amount of Canadian ore used in smelters was comparatively small, American ore being used mainly. If the $26,000,000 so expended had been paid in the way now suggested, the deputation believes iron mining in Canada would have been much more advanced than at present.

MAY MAKE NO MOVE REGARDING TARIFF

Attitude on Tractors Taken to Indicate the Policy to be Adopted

Ottawa.—The fact that the Government has decided to renew the order-in-Council passed on February 7 last reducing the duty on tractors valued at $1,400 and under, is taken here as an indication that there will be few, if any, tariff revisions in the budget. Were actions taken under the budget the whole question of agricultural implements generally would be opened and the tariff controversy would at once be precipitated into Parliament.

From present indications the Government generally favors the stand of the Canadian Manufacturers' Association and believes that there should be no general tariff revision until the terms of peace, at least, are known.

There is a considerable body of opinion in favor of the abolition this session of the seven and a half and five per cent. war tariff. This was imposed overnight and it is contended that it can be taken off without disturbing the revision schedule of 1907. It is, however, rumored that Sir Thomas White is not at present even in favor of this reduction.

That a Government caucus on the tariff will be held shortly after the session opens is believed to be certain.

RE OVERSEAS TRADE

The British Trade Commissioners in Canada (G. T. Milne at Montreal and F. W. Field at Toronto) have received cable advices from the Department of Overseas Trade (Development and Intelligence), that the following wide range of British manufactures have been placed on the free list, and now require no export license:

Artists' materials, athletic goods, bicycles, but not tires, bicycle accessories (various), buttons, except military, horn and vegetable ivory, cigar and cigarette holders, china and earthenware, china clay, clocks, drugs (various), fancy goods of paper, ivory, leather, etc., films (subject to censorship), flower seeds, fountain pens, furs (dressed, dyed or manufactured), glassware, hardware (iron and steel builders), hats, household effects of wood, iron or steel, ink, jewellery (imitation or pearl), laces, laundry machinery, ledgers, marble, mineral waters (unsweetened), musical instruments, office furniture, pictures, paintings, phonographs, photographic materials (not chemical), razors (safety and blades), ribbons (silk), spectacles, sewing machines, wallpaper.

Lists of goods for which export licenses are still required for shipment from the United Kingdom will shortly be in the hands of the British Trade Commissioners noted above. They will also be advised weekly by cable by their department in London of the goods removed from such list and any alterations thereto.

The British Trade Commissioners will be glad to take up these matters with local importers and others interested.

The following are some of the principal commodities for which licenses are still required:

Abrasives, agricultural machinery, cement, chemicals (various), coal and coke, oils, pipes (cast iron), packing cases, railway material, rosins, coal tar products, copper (wrought and unwrought, including wire), alloys, ores, foodstuffs, food for animals, iron and steel bars, billets and constructional material, steel angles, ingot plates and similar raw materials, textile machinery, textile yarns, fibres and waste, tin plates, war material, wire rope, wood and timber.

CATALOGUES

The Dominion Abrasive Co., Mimico, Ont., have issued an attractive catalogue listing the various types of grinding wheels manufactured by the firm. Where formerly wheels were sent out by the various wheel makers with only a certain amount of regard as to the speed of the wheel, and work, and other particulars as to the conditions under which they were to be run, science has stepped in and insisted that for every operation in grinding, the proper wheel made of suitable abrasives of exact grade and grain required to give the most satisfactory results must be provided. With this in view this catalogue has been compiled for the proper choosing of the right wheel for any class of work. The various processes used in making wheels are explained and the various grades and grain sizes are tabulated. General safety requirements and tables of proper wheel speeds are given. The mounting of wheels receives careful attention and protection hoods are dealt with. The various shapes of cup, cylinder, plain and special wheels are shown by means of engravings, and sufficient data given so that a wise choice may be made. An excellent index adds to its value for ready reference.

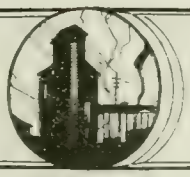
The Combustion Engineering Corporation, 11 Broadway, New York City, have recently issued a bulletin on their Type H stoker, which covers stokers for all classes of industrial and heat treatment furnaces. While many stokers are offered to the public for boiler plants, the Type H stoker remains the one best recognized in the following furnaces, and they are designed for sheet and pair furnaces, general forging, furnaces for drop forging, annealing furnaces, furnaces for rapid production of special shapes such as turnbuckles, sheet-steel, car wheels, arch bars, etc. The bulletin describes the mechanism of the stoker its construction and operation, and explains the reason for its high economy in operation and ease of control. Adjustment for reducing or oxidizing atmosphere may readily be made. The results obtained from the use of this stoker are given as follows: Absence of smoke, elimination of destructive gases, equable distribution of fuel, a clean fire, easy control of heat and even operation, resulting in a uniform high quality product. Figures are given which show the merits of coal-firing and its cheapness as compared to oil or gas fuel.

The use of coal, stoker-fired also results in the prolonged life of the roof and furnace linings.

Bulletin 106 of the Engineering Experiment Station of the University of

BRANDON

WINNIPEG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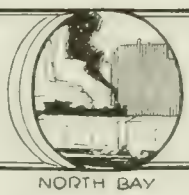
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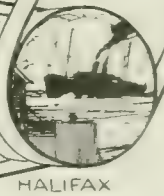
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Illinois gives the results of tests on a four-way reinforced concrete flat slab floor of the Western Newspaper Union Building in Chicago, Illinois, just before it was razed in 1917 to secure space for the present Union Passenger Station.

The floor construction used in the first five floors of the building was slab and girder type, while that of the upper three floors was Turner mushroom flat slab type with four-way reinforcement. The tests were made on the sixth floor. A test load of 913 lb. per sq. ft. was applied over four panels, each 17 ft. 5½ in. by 19 ft. 4½ in. This load was considerably greater in proportion to the design load than had ever been used in previous tests of buildings. The information secured, therefore, which shows the action of the slab in its various parts given by the strain measurements has an important bearing on the design of the flat slab structure. The text of Bulletin 106 is adequately illustrated by means of photographs and diagrams in which such data as the following are given:

"Arrangement of Reinforcement in Test Area," "Location of Gauge Lines in Upper and Lower Side of Slab," "Load-deflection and Location of Deflection Points," "Load Strain for Gauge Lines in Reinforcing Bars on Upper and Lower Sides of Slab."

The tests were conducted under the general supervision of Professor Arthur N. Talbot and the direct supervision of Harrison F. Gonnerman, Research Associate in Theoretical and Applied Mechanics in the Engineering Experiment Station.

Copies of Bulletin 106 may be had gratis by addressing the Engineering Experiment Station, University of Illinois, Urbana, Illinois.

The Canadian Fairbanks-Morse Company have recently issued a publication called "Steam Plant Material Specifications" which should prove of great value in the designing of power plants, and also in the ordering of material for their construction. The larger details of power plant designs are usually very carefully worked out in the drafting room, but in many cases the planning of detailed equipment, the installing of steam and water lines, pumps, heaters, traps, and other auxiliary apparatus is done in a more or less haphazard fashion. This state of affairs is no doubt due to the lack of available technical literature on the subjects of power plant specialties. The importance of proper design in the installing of valves, fittings, traps, heaters, and other detailed apparatus can scarcely be over-estimated, for while in many cases the material installed is small in size and of no great cost, the economies which can be effected by wise installation in this apparatus are very great. The Canadian Fairbanks-Morse Company in offering these specifications to the engineering public state that they are offered with the hope that they may prove of value to the steam power plant engineer and designer. The information is intended to be of use in the design and operation of the modern steam plant and the specifications were originally written by a well known engineer and subsequently carefully checked. General specifications are included dealing with the properties of materials commonly found in power plants. Steam lines are treated of in detail, the proper sizes and weight of pipe are taken up for varying pressures. Grip piping is considered and instruction is given for the proper making of bends. The proper type of flanges for various kinds of work are given and fittings are also included. Valves for modern conditions are a subject of great importance, and this importance is recognized in their treatment in this work. Boiler feed lines are treated of in detail in a similar manner to that described above in the treatment of steam lines. Expansion joints are also shown and exhaust lines come in for their share of description. Together with this material which is of great value in the design of power plant piping is included a condensed catalogue of power plant specialties handled by the Canadian Fairbanks-Morse Company. Much data of a technical nature is also given. This publication should be of considerable value to the operator or designer or engineer who has had to deal with the many problems encountered in the design and operation of the steam plant of whatever size

IGNITION ARCH AIDS COMBUSTION

Much better combustion can be had by erecting a so-called "ignition arch" over the fire, so as to entirely protect the gases from the chilling action of the boiler until the combustion is complete. To install such an arch properly, the boiler should be set at least a foot higher than is usual in ordinary practice, and the arch should be turned over the furnace from side to side, and be extended lengthwise of the boiler so as to cover the fuel-bed from the front end of the furnace back as far as the rear face of the bridge wall. There is no serious difficulty in making such an arch last well, if it is properly built in the first place, and if it rests securely against suitable buttresses at the sides of the furnace. It has no load to sustain, except its own weight. The arch should be built of special wedge-shaped fire-brick, made with a taper appropriate to the height and span that the arch is to have; and the brick should be laid with a thin paste of fire-clay, instead of with mortar or cement. The alternate courses of the brick should be set at slightly different levels, so as to make the under side of the arch irregular instead of smooth. The corners that are thus exposed become white-hot, and the ignition of any unburned portions of the gases that come from the fuel-bed is thereby greatly promoted. The arch should be high enough above the grates to allow the fireman to throw coal upon all parts of the fuel-bed without inconvenience, and to clean and bank his fires readily whenever it is necessary to do so.

The chief objection that boiler owners urge against installing an ignition arch of this nature is, that by doing so they sacrifice the heating surface that is immediately over the fire. The loss of a few square feet of heating surface in this way is far more than compensated, however, by the much better combustion that the ignition arch ensures. Moreover, the gases should be as hot as possible when they enter the tubes of a fire-tube boiler, because it is there that the absorption of heat should mainly take place.

The ignition arch, when properly put in, not only increases the economy of the plant by improving the combustion, but also obviates many of the troubles that arise in the boiler itself, under the usual conditions, from its direct exposure to the fierce heat of the fuel-bed. Bulging, burning, and cracks and leaks along the girth joints, are most likely to occur over the fire or the bridge wall. All troubles of this nature are diminished in large measure, and often eliminated altogether, by the use of an arch over the fire, as described above. It may be well to say that this device has long passed the experimental stage, and that it has been thoroughly tested by experience, and found to be excellent when properly designed and constructed.

THE ENGINEERING INDEX

The Engineering Index, published for 25 years in "The Engineering Magazine" and its successor, "Industrial Management," and universally regarded as the standard index to engineering periodical literature, has been acquired by the American Society of Mechanical Engineers, and hereafter will be compiled and published by this Society. The first issue of the Index under its new management appears in the January number of the "Journal."

As heretofore the Engineering Index will be regularly issued in three different forms:

1. As a part of "The Journal" of the Society.

2. As a separate monthly publication for libraries or individuals desiring to clip the items for indexing purposes.

3. As an annual volume in which all the items for the year are collected.

The Engineering Index originated with Prof. J. B. Johnson, of Washington University, St. Louis, Mo., in 1883, and for 12 years was prepared under his direction and published by the Association of Engineering Societies. It was then taken over by the Engineering Magazine Company of New York, and has since had the personal attention of Mr. John R. Dunlap, the president of that company, who has found it to be a widely appreciated undertaking by engineers throughout the world. The development of his magazine in the specialized field of industrial management; however, made it seem desirable to place the Index in the hands of an engineering organization covering a broader field and serving engineers engaged in more varied activities. The Society immediately recognized the opportunity extended and purchased the Index, thus

bringing "The Journal" the prestige, name and other rights and privileges of what has been regarded as the leading index in the field. This establishes the "Engineering Index" on a secure and non-competitive basis as a logical Society activity.

Through the facilities afforded by the magnificent library of the Engineering Societies, which regularly receives 1,100 periodicals from all parts of the world, the Society has unlimited possibilities in publishing the Index. These periodicals comprise one of the most complete collections of current engineering literature in the world—in not less than ten languages and received from thirty-seven countries. The indexing of engineering articles can be best accomplished by a professional organization and the Society will consider it one of its greatest services to place at the disposal of engineers, through the "Engineering Index" in "The Journal," the means for using the wealth of data and general information published from month to month in the world's technical press.

The plan of classification to be used is as follows: The articles are listed in the general field of engineering to which they belong, and are then grouped together under the particular branch of the general subject. The following classifications give an adequate idea of the scope of the "Engineering Index" as it will be carried in "The Journal": Mechanical Engineering, 31 sub-heads; Electrical Engineering, 11 sub-heads; Civil Engineering, 9 sub-heads; Mining Engineering, 14 sub-heads; Metallurgy, 7 sub-heads; Aeronautics, 19 sub-heads; Marine Engineering, 4 sub-heads; Organization and Management, 13 sub-heads; Industrial Technology; Railroad Enginering, 15 sub-heads; Munitions and Military Engineering; General Science, 3 sub-heads.

NATURE OF COMBUSTION

The process of combustion consists in the active and rapid combination of the fuel with the oxygen of the air. If the coal were composed of pure carbon, and the combustion were perfect, the fuel would be entirely consumed, and would eventually pass up the chimney in the state of the invisible gas known as carbon dioxide (or, more familiarly perhaps, as CO_2 or "carbonic acid gas"); but even in this ideal case the chimney gases would by no means consist of pure carbon dioxide, because air is not pure oxygen. Four-fifths of its bulk, approximately, consists of the practically inert gas nitrogen, and hence, even with perfect combustion and a pure carbon fuel, four-fifths of the gas passing up the chimney is nitrogen, and only one-fifth, at most, is carbon dioxide. The nitrogen takes no part in the combustion, except that by diluting the oxygen it checks the chemical action and causes it to proceed far more slowly than it would if the nitrogen were absent.

In practice the chimney gases contain various other substances besides nitrogen and carbon dioxide, because the fuel is never burned under strictly ideal conditions. If an excess of air is admitted to the furnace, a certain proportion of free and unused oxygen will pass up the chimney, while if the air supply is deficient the chimney will very likely discharge more or less of the gas that is known to the chemist as "carbon monoxide," and which burns with a pale blue lambent flame in household stoves when fresh coal has been recently thrown in. Moreover, coal is never pure carbon. In addition to a certain variable proportion of entirely incombustible matter which remains behind as ash, slate, and clinker, all coal contains more or less combustible matter besides the free carbon of which it mainly consists, and the softer bituminous varieties are particularly notable in this respect. The additional combustible substances to which we refer consist mainly of carbon and hydrogen, chemically combined with each other; and when they burn they generate more or less water-vapor, owing to the oxidation of the hydrogen. The natural moisture in the coal is evaporated at the same time, and the chimney discharges a considerable quantity of water-vapor from these two sources combined. The heat-producing power of coal varies considerably, according to the proportion of these secondary combustible substances that it contains, and numerous formulas and tables are available from which the quantity of heat that will be given out by a ton of coal can be calculated.

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POLSON IRON WORKS HAVE BEEN IN EXISTENCE FOR OVER THIRTY YEARS

NOT all the shipbuilding yards of the Great Lakes have been brought into existence by the abnormal demands of the great war. The institution that is the subject of this article has been in active service since the year 1888 under the same name, the Polson Iron Works. During this long life they have built a great variety of vessels, ranging from the famous roller boat, which lies in the bay close to the yard, and the railway car ferry illustrated here, to the 3,500 ton steamers for the Imperial Munitions Board and other interests that have been built during the last twelve months, and which are at present being built.

The yard contains four berths for building, each of them long enough to build the full canal size steamer. They are arranged on each side of the plate shop, two in line. Each berth has a large gantry crane running the full length of the berth, electrically operated. There is a ship on each berth at present, and one is in the fitting-out basin, almost completed, while a second ship is all ready for sea, and only just missed getting away before the close of navigation. The company built and delivered last year the "War Taurus," "Asp," "War Hydra," and "Tento." Besides the four vessels on the stocks at present, the company have contracts for six others, so that they will be busily occupied for some time to come.

The Polson Iron Works build all the boilers for the ships they construct, and in order to carry this work on, they have a large and well equipped-boiler making department. In this shop can be seen the Scotch marine boiler in every stage of its construction. A number of corrugated furnaces stand in one end of the shop, waiting to be fitted in their respective boilers, while in another part are the uptake breechings with their accompanying perforated plates for the Howden forced draught system. Combustion chambers all riveted up ready for fitting in the shells, end plates being flanged in the 150-ton hydraulic flanger, and a large plate bending roll are in evidence.

Occupying a conspicuous place in the floor space is a boiler almost completed, with workmen busily engaged in drilling the shell plates for the rivets with air-operated drills. Further on is a boiler shell in the initial stages of erection. Hydraulic pressure is supplied for the flanging machine and bull riveter by a three throw Deane pump, belt driven, delivering to an accumulator at 1,000 lbs. per square inch. A Canadian Ingersoll-Rand two-stage air compressor supplies air for the air tools used in this shop. The usual complement of wall drills, shears and punches is installed.

The erecting and machine shop are large and well lighted, and are fully equipped for the work in hand. As in the boiler shop, work can be seen here in every stage of progression. A set of triple expansion engines, completely erected, occupy the centre of the shop, with another set about half erected right opposite them. One sees a large low pressure cylinder being bored on a one hundred and twenty inch vertical boring machine, while the bedplate for the same set of engines is being planed on a huge planing machine. Connecting rods, crank shafts, eccentric rods in the rough, half finished and finished stages are being turned in the various lathes, of which there are an ample number. A notable feature of the erecting shop is a vertical gas heating arrangement, for facilitating the fitting of the brass liners on the tail end shafts. This apparatus has been developed by Mr. Wall, the works manager, after careful experiments, and has proved a time saver as well as a labor saver. It consists of a number of perforated pipes arranged to form a circle of about 24 inches diameter. The perforations open to the inside of the circle, and when gas is supplied to the apparatus, for a number of equal sized burners. The liner is placed in the annular space between the burners, and a readily controlled amount of heat is delivered equally all over the surface, expanding it sufficiently for the shaft to slide in the full length. This method allows the liners to be fitted in one piece, and not only that, but makes it possible to easily remove them if necessary, instead of having to cut them off, as was the old practice.

The Punch and Plate Shop

The punch and plate shop is located in between the two sets of building berths, and right in line with the plate storage. The large machines are of the direct steam driven type, that is rather unusual to see in these days of motor drives. The plate and angle furnaces are located in the same shop as the punches, and the large plate rolls are also in this shop. The heavy plate machines are arranged down the centre aisle, and consist of the usual double ended punch and shearing machines, horizontal angle punch, etc. The lighter machines are located on the sides, such as wall drills, small angle shears.

The forge is located at the shore end of the yard, and contains two steam hammers, and ten hand fires; also a small bending slab. Most of the forging for ships and engines is performed in this shop. At the end of the forge is a steam boiler plant, supplying steam for heating and driving the air compressor, which supplies the air for all the air tools in the yard.

Haste Not Everything

Discussing the shipbuilding situation with Mr. Frank E. Wall, the works manager and chief engineer of the Polson Company, the subject of making records in shipbuilding was brought up. Mr

Wall pointed out that building and completing a vessel in the shortest possible number of days was not so desirable an accomplishment as the general public might be led to believe. He pointed out that many of these ships, after a short trial trip, had to be re-docked and considerable time spent on them, before they could undertake a long voyage, but this phase was never referred to in the published reports of the records achieved. He held it was more desirable

FRANK E. WALL

to take a reasonable length of time for the building and completion of the ship, so that when she was completed she was ready to start on a voyage of any duration without the necessity of dry docking.

Mr. Wall was born in London, England, in 1884, but came to the United States with his parents when only one year old. His development has been, therefore, under American manners and ideals. After serving an apprenticeship in the engineering trade, Mr. Wall went through a course of study under a private tutor in naval architecture.

His first important position was in the United States Navy yard in Norfolk, Va., in 1905, and from there he went to various responsible posts, one of them being on the engineering staff of the Public Utilities Commission of New York City.

In 1915 he went to Mobile, Alabama, to supervise the building of the shipyard there, and so successful was he here that the United States Government called for his services in 1917 as a supervisor of steel ship construction, which position he filled until coming to the Polson Iron Works in the spring of 1918.

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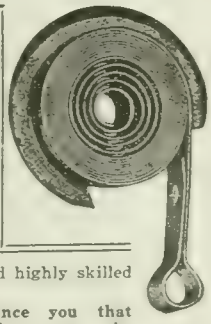

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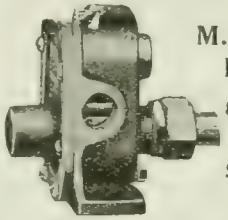

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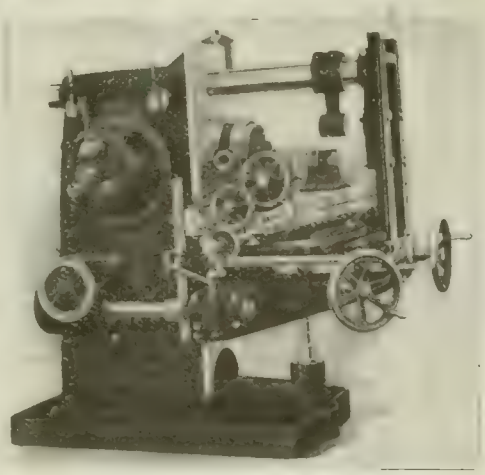

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5	H.P.,	550	VOLTS,	1,200	R.P.M.....3
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200 K.V.A., 2200/2300—14000/15000, 60 Cycles.

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Also supplies of all kinds, including Shafting, Hangers and Pulleys, Belting, Steel Lockers, Time Clocks, Trucks, Standard and Hydraulic Valves, Pipe Fittings and Packings, Tool Steel, Twist Drills, Milling Cutters, Taps, Files, and complete machine shop equipment.

Everything offered at attractive prices. Write NOW for further information and quotations.

WILLIAMS & WILSON, LIMITED

320 St. James Street :: :: MONTREAL, QUE.

3

PUNCH PRESS WORK

What Can You Save?

By Using Parts Made in the Punch Press

Look over your standard parts, Mr. Manufacturer, and see what parts can be made (or could be made by slight change in design) by this process.

You will be surprised at the saving you can effect.

We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

A Battery of presses is also available at our plant to manufacture parts for you with the understanding that you pay only for good parts made. Our facilities ensure prompt deliveries at right prices.

W. H. BANFIELD & SONS LTD.

370-386 PAPE AVE., TORONTO.

IMPERIAL MUNITIONS BOARD OFFER FOR SALE

PLANT AND EQUIPMENT (IN PART) OF

British Cordite Co., Ltd., Nobel, Ont.

TENDERS, accompanied by marked cheque for 5% of the amount of the bid, will be received by the undersigned up to and including February 20th, 1919, for the purchase of the following, located at Nobel, Ontario:—

ITEM NO. 1. POWER HOUSE.—Building of steel frame construction on concrete foundations.

Boiler-room Equipment.—10-400 H.-P. Wickes, vertical, water tube boilers, equipped with Murphy Automatic Stokers and 2-1 ton coal-weighing lorries.

Ash Handling System—American Steam Jet Ash Conveyor.

Power-House Equipment.—3 Turbo Generators, 3 phase, 2200 volt, 60 cycle; 1-750 K.W. Auto Chamers; 1-500 K.W. General Electric; 1-1000 K.W. Westinghouse-Parsons, complete with Westinghouse LeBlanc Jet Condenser and 80 H.P. Sturtevant Turbine direct connected to Booster Pump; 1-25 K.W. Westinghouse-Turbo Exciter Set, 125 volt; 1-25 K.W. Canadian Fairbanks-Morse Motor Exciter Set, 550-volt motor, 125-volt generator; 1-30 K.V.A. constant current transformer.

Switchboard—11 panels fully equipped, 1-10 K.V.A., 2200-110 volts and 3-40 K.V.A., 2200-550 volts, Pittsburgh Transformers; 2-18 x 10 x 12 Worthington Fire Pumps; 2-14 x 22 x 14 x 16 Ingersoll-Rand Air Compressors; 2 No. 785 Cochrane feed water heaters; 4 Alberger heaters; 2-Frick Ammonia Compressors, 30 and 70-ton capacity; 2-4" Goulds Centrifugal Pumps, direct connected to 15 H.P. motors; 4-1¼ x 8 and 2-5½ x 8 Deane Single Acting Triplex Pumps, belt driven; 1-42 x 10½ x 48 Hydraulic Pneumatic Accumulator.

ITEM NO. 2. PUMPING STATION.—Equipment—6-9 x 12 Aldrich Triplex Pumps, directly connected to 40 H.P. Canadian Fairbanks-Morse, 550 volt, 40 amp., 60 cycle, 3 phase motor, with starting compensators and switch boxes; capacity 500 gallons per minute; 3-75 K.V.A., 2200-550 volts and 1-550-100 volts Pittsburgh Transformers.

ITEM NO. 3. MACHINE TOOLS.—18" Engine Lathe; 20" Drill Press; No. 4 Power Saw; Keyway Cutter; 16" Stroke Shaper; 10" Emery Wheel Stand; No. 34 Little Giant Screwing Machine with taps and dies.

ITEM NO. 4. TANKS. Steel Horizontal 33 6' to 20 diameter. Steel Vertical 41 " to 8' diameter.

ITEM NO. 5. STOVES. 7 Nos. 41 and 12 Quebec Heaters; 5 Oxford Ranges and 16 Oil Stoves.

ITEM NO. 6. STEEL CANS.—12,900 Steel Cans, with lugs and lids, 11½" x 12" x 3-32".

ITEM NO. 7. COTTAGES.—15 Cottages, frame construction, 20' x 34'.

ITEM NO. 8. PRESSES.—8 Dehydrating Presses (Hydraulic).

ITEM NO. 9. PUMPS.—8 Gardner Duplex Pumps, 7" x 3½" x 10".

ITEM NO. 10. WRINGERS.—20 Centrifugal Wringers 24".

ITEM NO. 11. STOCK DRYERS.—3 Sargent (Stock Dryers).

ITEM NO. 12. PICKER MACHINES.—3 Davis and Furber Picker Machines 36".

ITEM NO. 13. KNEADERS.—52 Kneader Machines.

ITEM NO. 14. PRESSES. 19 Darling Presses (Hydraulic). 22 Inglis Presses (Hydraulic).

ITEM NO. 15. PUMPS. 16 Hydraulic Triplex Worthington Pumps, 1 x 4 for 2,000 pounds pressure.

ITEM NO. 16. PUMPS.—10 Vertical Triplex Single Acting, belt driven Worthington Pumps, 3½" x 6" for 250 Pounds Pressure.

ITEM NO. 17. PUMPS.—6 Aldrich Pumps, Vertical, Triplex, Back plunger of the solid water end type, double reduction, direct geared for 900 R.P.M. Motor, 9" x 12", Cap. 500 G.P.M., lift 150'.

ITEM NO. 18. BELTING.—A quantity of leather and rubber belting.

Tenders for these items in whole or in part will be considered. The owner will dismantle and load on cars; bids are to be made on this basis. Intending purchasers will be given every facility to inspect the buildings and equipment. Complete information may be obtained from the undersigned.

The highest or any tender not necessarily accepted.

Cheques from unsuccessful bidders will be promptly returned.

R. HOME SMITH

AGENT IMPERIAL MUNITIONS BOARD

18 KING STREET WEST, TORONTO, ONT.

Phone, Ad. 1590

The Financial Post THIS WEEK

ON BANK MERGERS

"IN conclusion, let us repeat that THE FINANCIAL POST stands against bank mergers or other business or industrial combinations which will permit of restriction of public service or the exaction of undue profits, but favors such consolidations as tend to reduce costs of production or service rendered, which is in the last analysis in the interests of the whole people."

ON THE TARIFF PROBLEM

"THE FINANCIAL POST does not now and never has defended a 12½ per cent tariff; it does not stand for any specific tariff, but it does stand for the intelligent and adequate protection of national industries so that Canada may secure the full benefits of the developments of all her natural resources. That this may be accomplished and that at the same time the necessities of a tariff for revenue may be carefully considered, we have time and again advocated the appointment of a tariff commission to treat scientifically with the whole situation and to provide a meeting ground for the divergent opinions of labor, industry and agriculture."

ON THE PORK SITUATION

"The newspaper contention that Mr. Hoover is getting the British business for American firms, and that the British Government is discriminating against the Canadian product, is hardly a correct or a fair one. The embargo is absolute, against both Canadian and American pork products."

Besides the important articles from which the above quotations are made, THE POST this week deals with the following amongst other

SUBJECTS OF INTEREST

The Effects of Merger on Bank of Nova Scotia
Australia to Have Agent at Ottawa
Uniform Laws for All Canada
Peace Between Capital and Labor—And Prosperity
The December Bank Statement
Small Packing Plant to Close
Brompton Shows Slight Drop in Earnings on Common
Over $350,000,000 Put Into Electric Projects
Total Clearings for the Week Show Increase
Canadian and American Banking Interests Join
A Bank Misunderstanding With Customer
London Supreme in Money Market
About Bank Mergers (Editorial)
Farmers' Platform on Economic Issues
Scarcity of New Issues is Market Feature
New Pulp and Paper Issue Announced
Manufacturers of B.C. Discuss Income Tax
Ratepayers of Halifax Vote Dissatisfaction
Quebec Province Has Large Surplus
Excelsior Life Wrote Record New Business
Continental Life Writes $2,946,762 New Business
Border Cities Want Some of Housing Loan
The Sugar Supply
Larger Loans and Profits of Dominion Bank
Effects of the Merger on Bank of Nova Scotia
Profits of Toronto General Trusts Show Recovery
Development of Trusts and Guarantee

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The MacLean Publishing Co.,
143-153 University Ave., Toronto.

Send me THE FINANCIAL POST every week till further ordered. I will pay subscription price $3.00 per year on receipt of bill or you may draw on me for this.

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Address .....

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SPECIAL MACHINERY

Special Machinery, Gears, Jigs, Fixtures, Punches and Die
Small Tools, Screw Machine Products, Gauges, Etc

CONTRACT WORK

ELLIOTT & WHITEHALL
MACHINE & TOOL CO.
GALT, ONT.

SPECIAL MACHINERY
JIGS AND FIXTURES PUMPS
GAUGES GASOLINE ENGINES
GEAR CUTTING

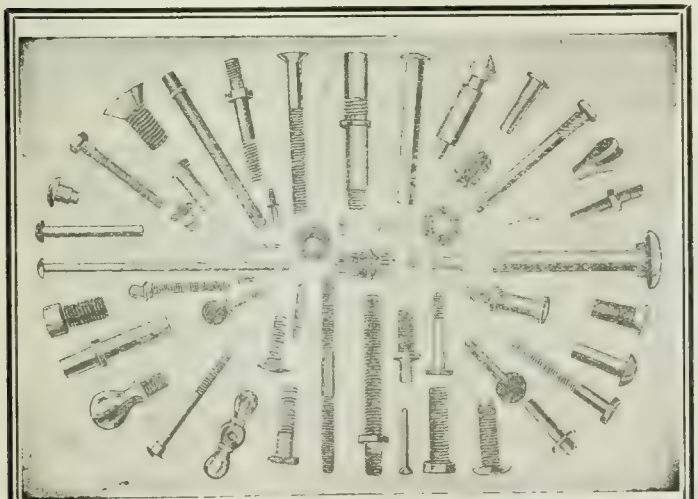
ALL EQUIPMENT REQUIRED FOR RAPID AND ECONOMICAL PRODUCTION OF INTERCHANGEABLE PARTS. PROMPT ATTENTION TO ALL WORK.

Hyde Engineering Works
27 William St. - - Montreal

Enquiries Solicited for

General Machine
Contract Work

P. O. Box 1185 Telephones 1863-1864



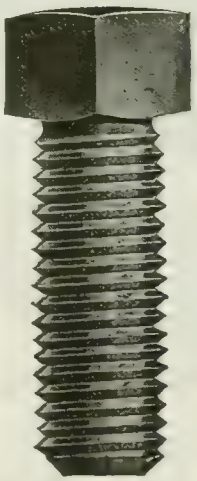
Automatic Screw Machine
ACCURACY Products QUALITY

Our Mechanical Engineers are
at the service of our Clients.

United Brass & Lead, Limited
St. Helen's Avenue, - Toronto

W. L. TOBIAS, *Superintendent*
Formerly Superintendent National Cash Register Co.

ACCURACY



When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company Limited, 49 Common St., Montreal, Que.

If any advertisement interests you, tear it out now and place with letters to be answered.

RACKS and PINIONS
LARGE SIZES OR SMALL

CUT GEARS

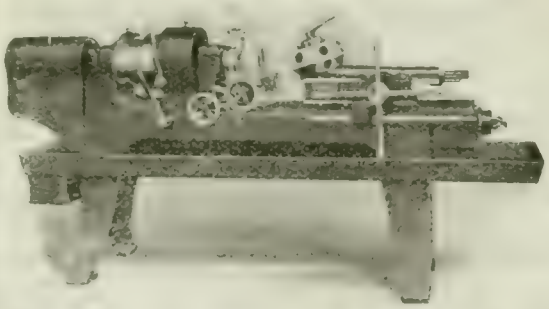
Get Our Quotations

HAMILTON GEAR AND MACHINE COMPANY
VAN HORNE ST. TORONTO

"Nichrome" Castings
"Made to Endure High Temperature"
CANADIAN DRIVER-HARRIS CO.
CHICAGO
WALKERVILLE, ONT.
CANADA
HARRISON, N. J.
MANCHESTER ENGLAND

The Advertiser Would Like to Know
Where You Saw His Advertisement
- - - - - *Tell Him* - - - - -

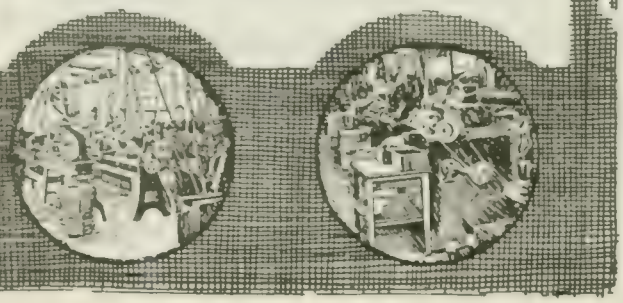
THE TILTED TURRET
A CLEAR TRACK FOR THE STOCK



INVESTIGATE!
SEND FOR
CATALOG "C"
OR
ASK THE USER
WOOD TURRET MACHINE CO
BRAZIL INDIANA U.S.A.

SPECIAL TOOLS

Automatic Machinery
for all purposes
Punch Press Work
Screw Machine Products
Consult us on your machine problems
Toronto Tool Company
516 Richmond St. West Phone Adel. 1181



Small Size
Gray Iron Castings
Jobbing

General Machine Contract
Work and Patterns made
to Blue Prints
Sketches or Sample

Prompt, Efficient Service
Charges Moderate

A. Bernard Industrial Co.
Office and Works:
Fortierville, Que.

Practice Economy. How?

By sending me your orders for Wilt Twist Drills, both Carbon and High Speed.

Three points to consider:

First—Quality
Second—Service
Third—Price

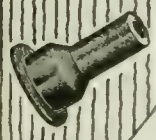
I can give you the advantage of all three.

Just Phone or Write.

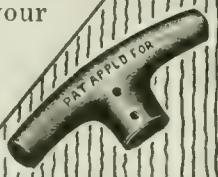
J. A. M. TAYLOR

318 Stair Bldg. M. 786 Toronto

TOOLS & STAMPINGS



We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.



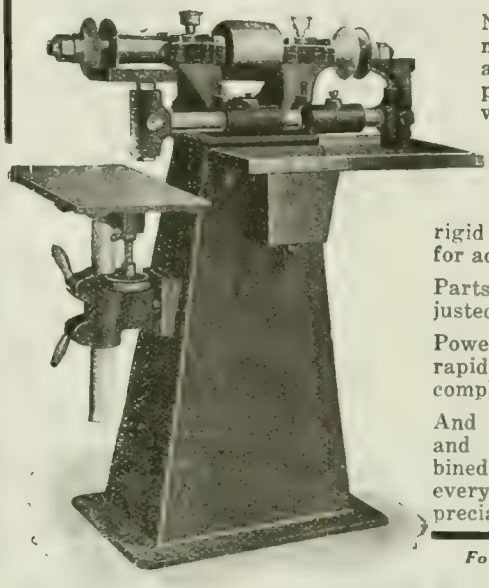
HOMER & WILSON

Stamping and Tool Works

1-5 Lancaster St. HAMILTON

WING

SURFACE GRINDER



Not a big, costly machine—a capable moderately priced grinder whose every part is extra strong.

The grinding surface is as rigid as it should be for accurate work.

Parts are easily adjusted.

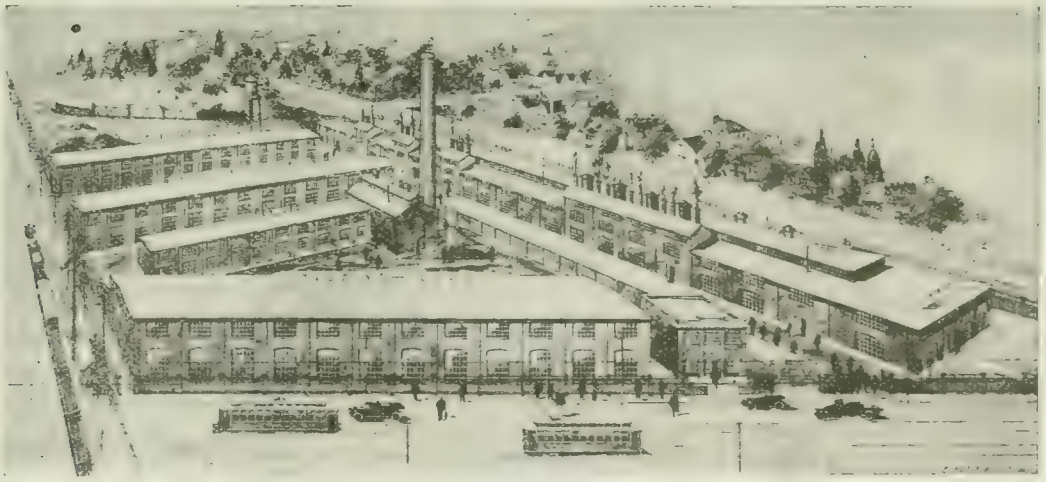
Power is ample for rapid, economical accomplishment.

And the large tray and water pot combined is a feature every operator appreciates.

For Full Particulars WRITE

J. E. WING & SON, Hamilton, Can.

WE ARE ENLARGING OUR PLANT



Hull Iron & Steel Foundries, Limited

"HISCO" will shortly have an increased capacity which will make it the largest foundry of its kind in Canada.

Two big new electric furnaces are being added to our present large equipment. A cleaning and annealing department measuring 300' x 100' is about to be completed.

This will place us in a position to handle orders big and small with unequalled facility.

We make steel, Chrome, Manganese and Nickel Steel Castings—annealed and unannealed.

Cement Mill and Mining Machinery Castings; Stamp Mills, Crushing Plants, and Excavating Outfits.

Steel Car Wheels, Locomotive Driving Wheels and Frames, and all Castings for car builders and locomotives.

GEARS—Machine moulded, any size up to 18 feet without patterns.

Hull Iron & Steel Foundries, Limited, Hull, Que.

At Your Service

Let Us Quote on Your Contract Work

Our Staff is always available for Consultation.

PATTERNS
CASTINGS
FORGINGS

And Machine Work of all Kinds

VICTORIA FOUNDRY CO., LIMITED

OTTAWA - CANADA

Dominion Cast Steel Parts

We are also prepared to furnish steel plate to 20" wide — for prompt delivery.

We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

Open Hearth Products

Machinery Castings of all kinds, Motor Frames, etc., for electrical trade, Pedestal and Miscellaneous Bridge Work, Rolling Mill and Blast Furnace Castings, Gears and Gear Blanks.

Quick Deliveries

Quality and Economy

THE DOMINION FOUNDRIES & STEEL, LIMITED

HAMILTON - - ONTARIO

SPECIAL MACHINERY

Built to Orde

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

MADE IN BR·EN·CO CANADA

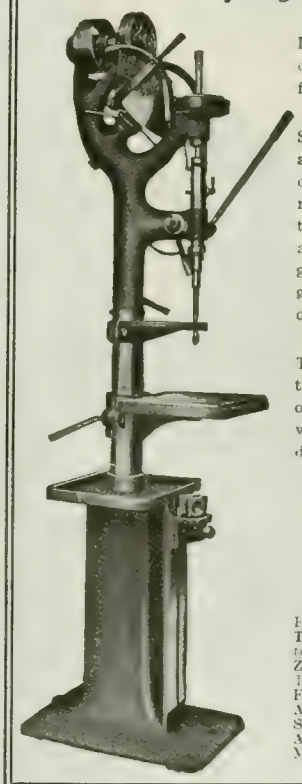
Brown Engineering Corporation
LIMITED, TORONTO
415-419 King St., W. Tel. Adel. 425

STEEL CASTINGS

1 to 5,000 pounds
Highest Quality
PROMPT AND RELIABLE SERVICE
We make a specialty of Carbonizing Boxes and Cyanide and Lead Bath Pots
SWEDISH CRUCIBLE STEEL CO. OF CANADA, Ltd., Windsor, Ont.

Can Ship at Once

Your Albany High Speed Tool Room Drill



It is ready for immediate use, and you can use it immediately, at any speed from 268 to 2140.

Starts and stops quickly; speed changes are made easily, and both the speed the drill is running and the speed it should run in different metals are shown on the machine; changes of drills or chucks are rapidly made; micrometer depth gauge, with both metric and English graduations, accurately controls depth of drilling.

This is really a wonderful machine of the highest grade construction throughout, and absolutely guaranteed in every way. It will be a pleasure to send full description; ask for it.

Albany Specialty Mfg. Company
Albany, Wisconsin

FOREIGN AGENTS: F. W. Horne & Co., Tokyo, Japan, China, Korea. R. L. Sennton Co., Ltd., Sydney, Australia and New Zealand. Litton's Machine Tool Co., London, England. A. Berthom, Grenoble, France. V. Lowner, Copenhagen, Denmark. Aktiebolaget Rylander, Asplund, Stockholm, Sweden. Gillespie Bros. & Co., South Africa (New York City). Monti & Oscuro, Milan, Italy.

Tool and Gauge Work

Our present equipment, which is unexcelled in Canada, enables us to produce Thread Gauges, Tools, Dies, Jigs, Fixtures and other gauge work upon short notice.

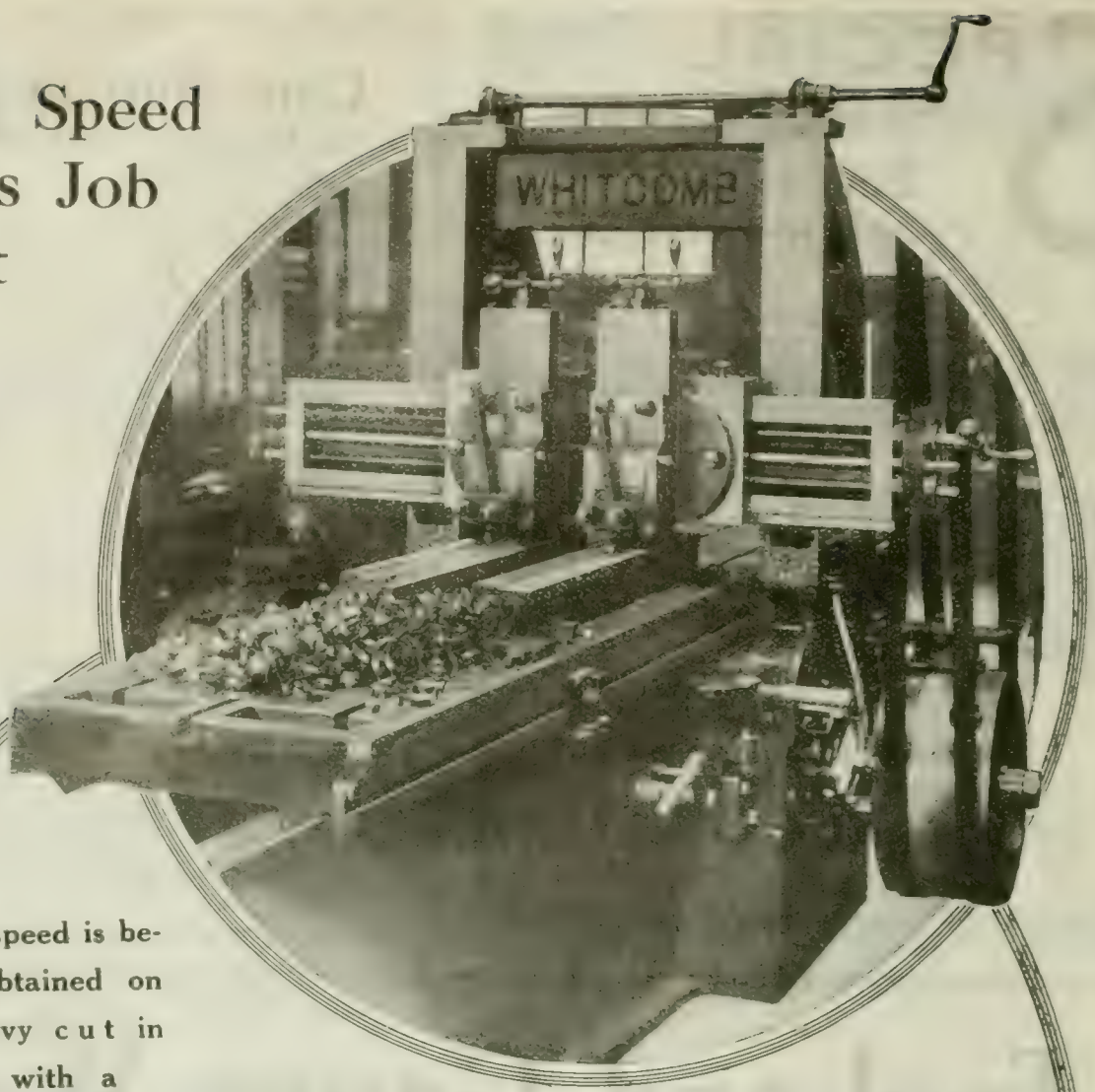
Our usual guarantee of quality supports our claims.

Windsor Machine & Tool Works

WINDSOR, ONTARIO
ESTABLISHED IN 1910
Representatives for Quebec Province: Canadian Utilities Steel & Engineering Co., 149 West Craig St., Montreal, Que.

If any advertisement interests you, tear it out now and place with letters to be answered.

Cutting Speed on This Job 70 Feet Per Minute



That speed is being obtained on a heavy cut in steel, with a

Whitcomb-Blaisdell Planer

The Planer with the Second-Belt Drive

The smooth, easy action and rapid, yet gentle, reverse required for such rapid cutting rates is secured by the distinctive table drive of the Whitcomb-Blaisdell Planer.

There are many other Whitcomb-Blaisdell Planers operating at similar high speeds in steel. In numerous cases they are planing brass, copper and other soft materials at one hundred feet per minute.

The Second-Belt Drive—using a belt and pulley to convey power from the pulley shaft to the drive-pinion shaft—eliminates the usual bull wheel and the rapid running train of gears.

On the Whitcomb-Blaisdell Planer, the table is given a smooth, quiet, yet powerful drive. At the end of the stroke the belt transmission acts with a cushion effect and the planer reverses without shock or jar, yet with the utmost speed.

That is one reason why this machine attains the highest speeds without impairing the accuracy or finish of the work.

Write for Illustrated Catalog that tells all about it.
The big features of this machine will be of interest.

WHITCOMB - BLAISDELL
MACHINE TOOL CO.
WORCESTER, MASS., U.S.A.

LATHES PLANERS

The Briggs Miller

This advertisement is not produced for you who will long remember how ably Briggs Millers handled shell work.

It is reproduced for the information of men who had nothing to do with munitions making but whose common sense tells them that the exacting demands of such work showed machines at their best—or worst.

If your shop needs a Miller, ask a man who made munitions his opinion of the Briggs.

Gooley & Edlund, Inc.

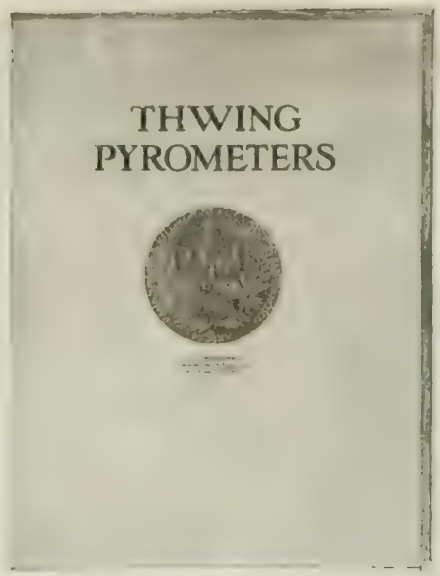
Cortland, N.Y., U.S.A.

Canadian Representatives:

Garlock-Walker Machinery Co., Ltd.

Winnipeg TORONTO Montreal

Foreign Agents: Allied Machinery Company of America, France, Belgium, Italy, Switzerland, Russia, Scandinavia, C. W. Griffiths & Co., London, Manchester and Glasgow, Pan-American Machinery & Cia, San Sebastian, Spain.



Your Copy Is Ready For Mailing Send For It To-day

HERE'S a book that everybody with heat control problems ought to read—not a mere catalog of Thwing Thermo-Electric, Radiation and Resistance Pyrometers, but an engineering discussion of important economies and possibilities —a collection of good hints and advice on how to get accurate heat control with inexperienced labor, how to make conscientious men more valuable, how to compel proper attention, how to get a higher percentage of **first class** heat treated metal in shorter time and with less (often **very much less**) fuel, etc. Among interesting subjects on which every one interested in heat treatment should be posted, are included the following. Proper use and comparative advantages of multiple recorders and indicators for pyrometers; base-metal vs. platinum thermo-couples; correction of cold-end error-protection and mounting of thermo-couples; advantages of high-resistance galvanometers; theory of thermo-electric, radiation and resistance pyrometers; methods of determining critical points of carbon steels; calibration of pyrometers; helpful wiring suggestions, and miscellaneous data on exact melting points, heat treating temperatures in various industries and conversion of Centigrade to Fahrenheit temperatures and vice-versa.

In sending for your copy, tell us what you use pyrometers for so that we can give you additional interesting data applying to your individual conditions.

32

Thwing Instrument Co.

34th St. and Lancaster Ave. - Philadelphia, Pa.

Canadian Representative:
James DeVon, 227 Davenport Road, Toronto, Ont.

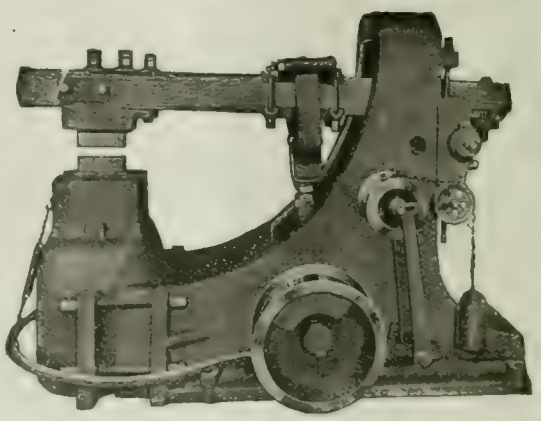
A Rochester Helve Hammer and a Smith are Mighty Good Company for Each Other

ROCHESTER HELVE HAMMERS

Six Sizes
Two Styles of Frames

Are adjustable for length of stroke while running.

Long stroke provides for handling larger work than other hammers of the same head sizes and the springy forging blows delivered by the solid hickory helves combine advantages of forging and drop hammers.



THE WEST TIRE SETTER CO.
ROCHESTER, NEW YORK

The Hammer With The Human Stroke

HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the **High Speed Riveting Hammer** does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

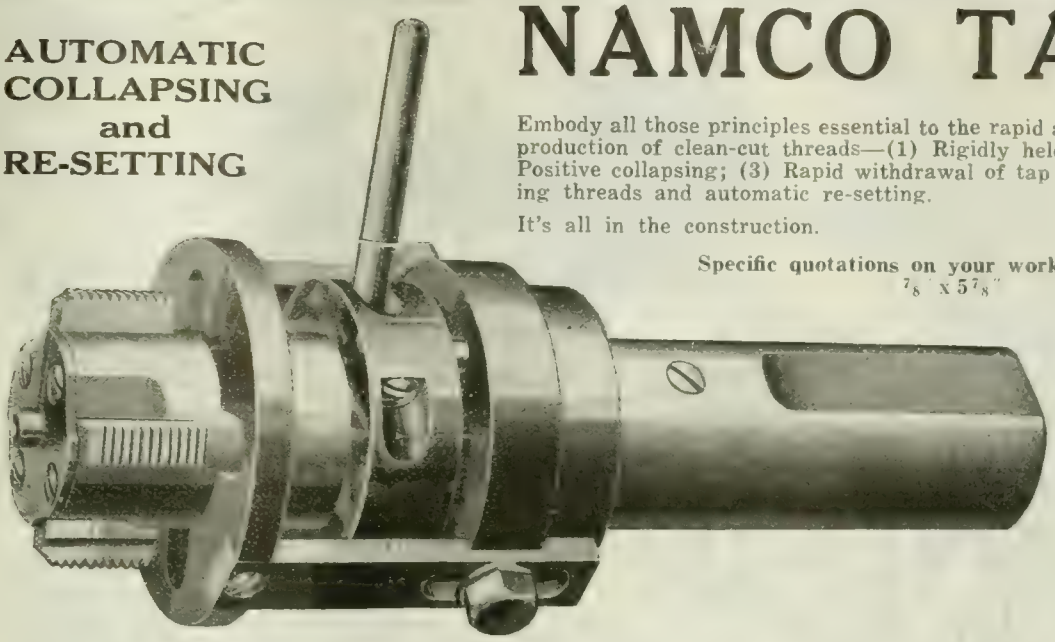
AUTOMATIC COLLAPSING and RE-SETTING

NAMCO TAPS

Embody all those principles essential to the rapid and economical production of clean-cut threads—(1) Rigidly held chasers; (2) Positive collapsing; (3) Rapid withdrawal of tap without injuring threads and automatic re-setting.

It's all in the construction.

Specific quotations on your work. Capacities, $\frac{7}{8}$" x $5\frac{7}{8}$"



THE NATIONAL ACME COMPANY

New England Plant WINDSOR, VERMONT

CLEVELAND, OHIO

Canadian Plant MONTREAL, P.Q.

Branch Offices: New York, Boston, Chicago, Detroit, Atlanta, San Francisco
Representatives in Foreign Countries

Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio.

RICKERT-SHAFER TAPPERS

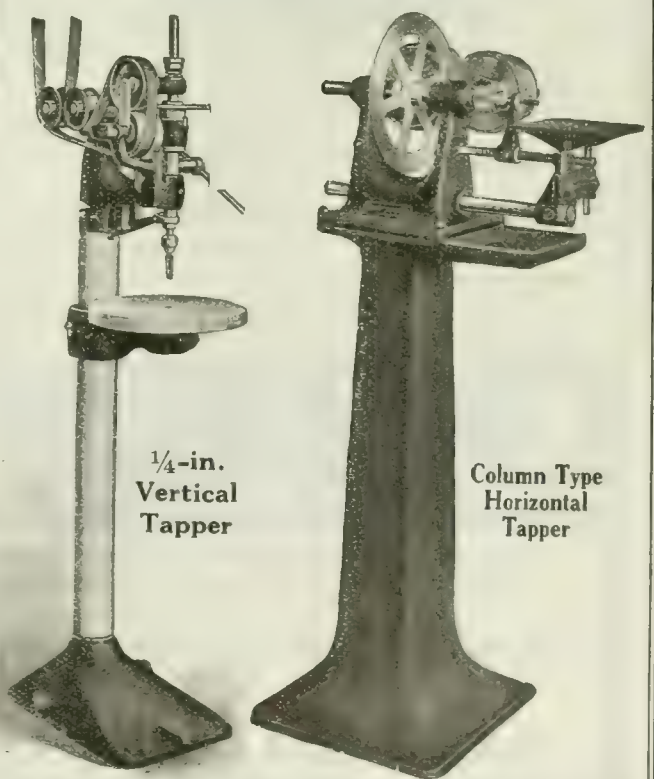
Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on $\frac{5}{8}$-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

Write for specifications



¼-in. Vertical Tapper

Column Type Horizontal Tapper

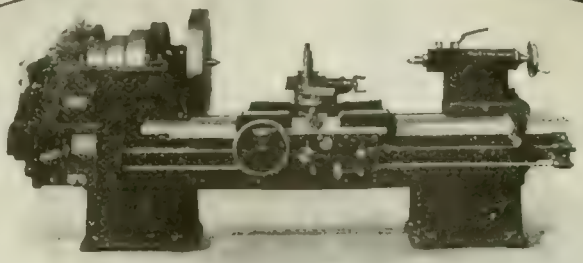
The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England

Powerful ! Rigid !

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool-room work or the heaviest duty shipyard or munition plant rapid production work.



SIDNEY For service

Illustration shows "SIDNEY" 25-INCH HEAVY DUTY LATHE. Takes deep cuts through the toughest metal—and does it without a pause and with never a chatter. Specifications include 3-step cone, double back gear, semi-quick-change gear lathe, built on 10-ft. bed. This lathe also furnished with quick-change gears. Bed lengths available, 10, 12, 14, 18 and 20 feet.
Be sure to write for our new Bulletin.

Canadian Agents
THE GEO. F. FOSS, MACHINERY & SUPPLY CO
Montreal Quebec
H. W. PETRIE, LIMITED, Toronto, Ontario

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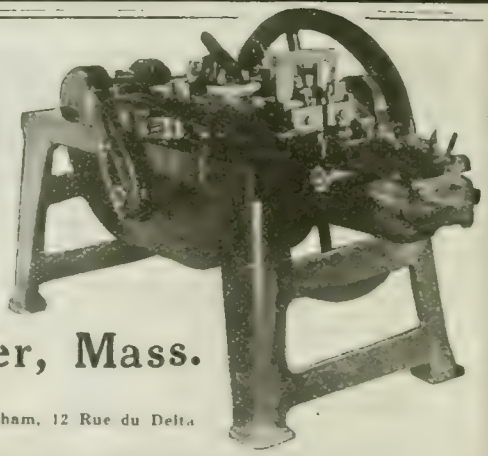
MAKE NAILS! NOT NOISE!

We offer the trade new types of

WIRE NAIL MACHINES

QUIET IN OPERATION; WITH VERY HIGH OUTPUT; ALL PARTS ACCESSIBLE; DECREASED MAINTENANCE COSTS; GREAT CAPACITY; OCCUPYING SMALL FLOOR SPACE.

Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 6 sizes, handling wire from No. 17 to ¾" diam.



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GREY IRON Castings

Special Equipment Built to Specification
Steel Plate and Structural Steel Work
Quality and Prompt Service Double-Sure

WILLIAM HAMILTON COMPANY, LIMITED,

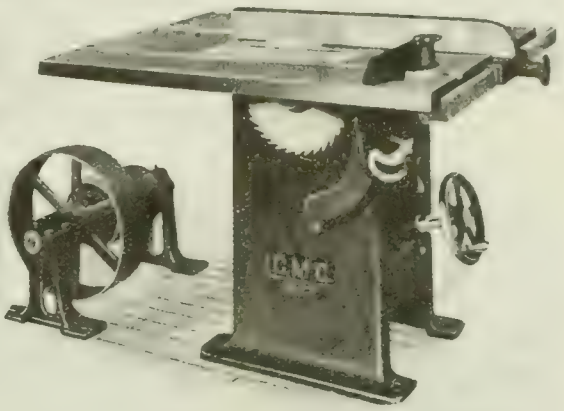
Peterborough, Ont.

"Treat Your Machine as a Living Friend"

When you need a thing you pay for it whether you buy it or NOT.

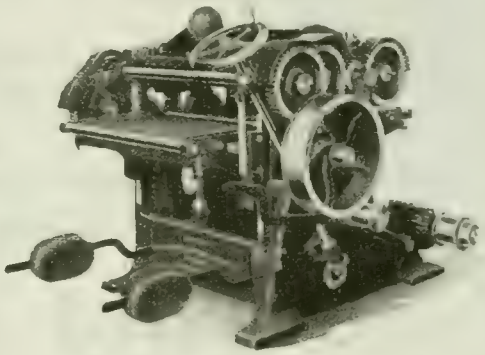
DO you need any Woodworking Machinery in your pattern shop or carpenter shop? A few suggestions are offered herewith.

Consult us if you want the best in Woodworking Machinery for making patterns, sashes, doors, furniture of all kinds, and any article manufactured from wood.



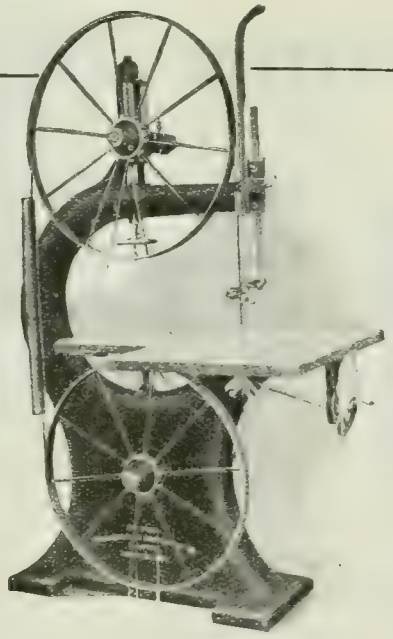
No. 125 Tilting Top Saw Table

A medium weight machine, very desirable for pattern shop work. Supplied with guard. Capacity up to 3" thick



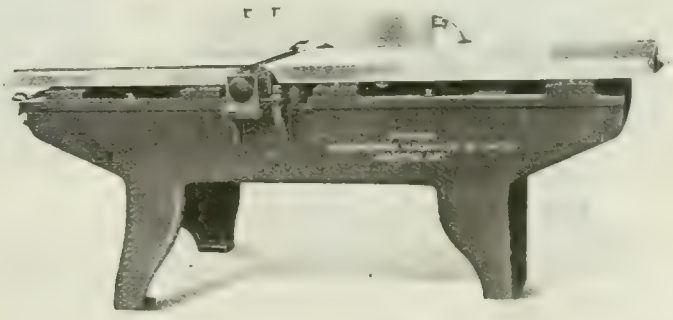
No. 121 Light Surface Planer

Planes either 20" or 24" wide x 8" thick. Much superior to a larger machine for running material within its limit.



No. 132-36 Band Saw with All-Steel Wheels

Guarded to meet requirements of Factory Inspector



No. 143 Buzz Planer and Jointer

With round safety cylinder and guard to conform with safety requirements of Government Inspectors

The ***Preston Woodworking Machinery Co., Ltd.,*** *Preston, Ont.*

PLUMBING, BUILDERS and HARDWARE

Galt Ont.

GREY The KA—TIE Trade Mark Foundry IRON

CASTINGS

These are our SPECIAL LINES. But at this time we are prepared to handle contract work up to 15 tons per day. For gated pattern, match plate, stripping plate, machine and repetition work of any kind we are prepared to quote you most attractive prices and prompt delivery.

Would You Like to Know

the analysis and physical test of metal in your castings? How they could be made cheaper? What properties of metal would facilitate your finishing operations or improve their quality?

We can furnish semi-finished Castings, being equipped to do lathe drilling and reaming work—also expert metal pattern work.

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Grind your cutting tools in exactly the right way to get best results—and you save time. That's obvious. It is precisely that that this Tool Grinding Chart enables you to do.

It has been adopted as standard by many firms that found it a long way better than guess work.

CANADIAN MACHINERY would like to see this Chart in every shop in the Dominion. Mail the coupon below for your copy to-day.

Shows at a glance Correct Clearance and Rake Angles for Cutting Tools

CANADIAN MACHINERY,
153 University Avenue, Toronto.

Please send me/us free, one of your tool grinding charts.

Signed.....

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If you are desirous of improving yourself in your trade and so putting yourself in the position of making more money, these Mechanical Engineering Books will be found helpful.

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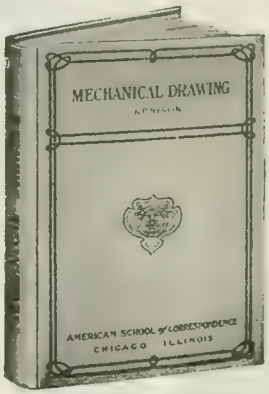

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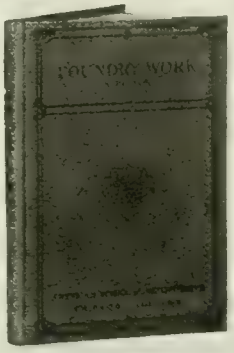

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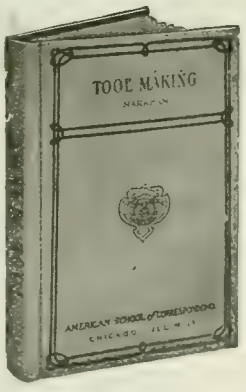

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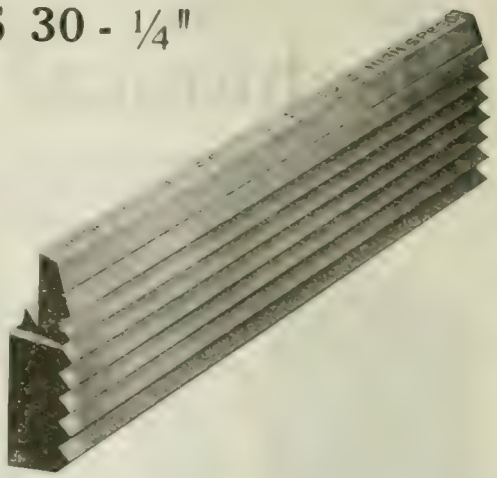
Technical Book Department

MacLean Publishing Company **143 University Ave., Toronto**

LANDIS DIE HEAD PRODUCES 30 - 1/4" BOLTS PER MINUTE



Threading 30 1/4" bolts per minute is the job of a Landis Die Head in a big plant. This production is not obtained spasmodically, but the head day by day has been maintaining this same steady pace.

The chasers used on this job have been ground but once in two weeks. Do you get the full meaning of this? The Landis Chaser has at least three inches of available cutting material and only 1/32 inch is removed at each grinding. Consider then the life of one set of chasers and the corresponding low cost of upkeep.

This same company have six heads in all installed, and every one is producing results which have one meaning—the superiority of the Landis Die.

Do you obtain such results? Send us your specifications and let us prove to your satisfaction that the Landis Chaser will insure better threads, a higher production, and an extremely low threading cost.

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LANDIS MACHINE COMPANY
WAYNESBORO, PA.

An Innovation In the Field of Wall Radial Drills

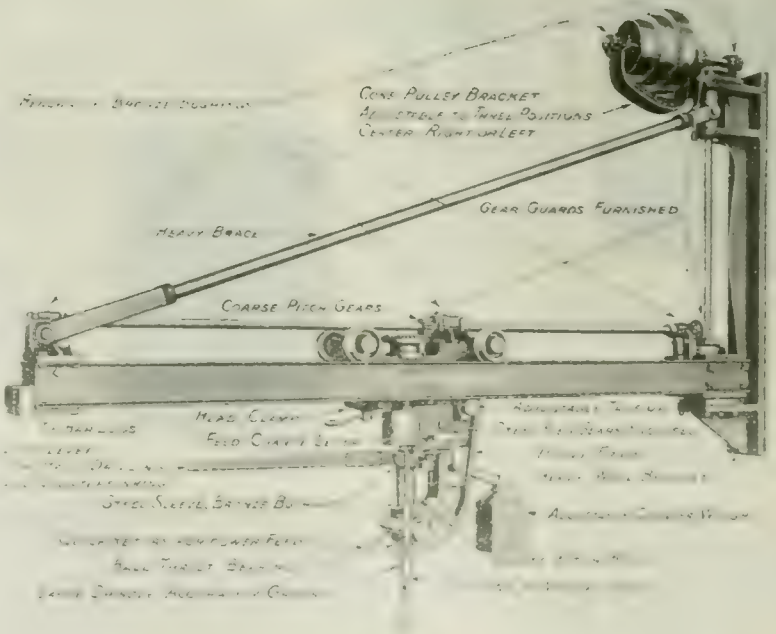
You really can't afford to be without this drill. It's a maximum producer, the entire control being placed within easy reach of the operator. Workmanship and material beyond criticism. Satisfied customers assure us the machine is a "dandy."

Better get our bulletin to-day, giving detailed description.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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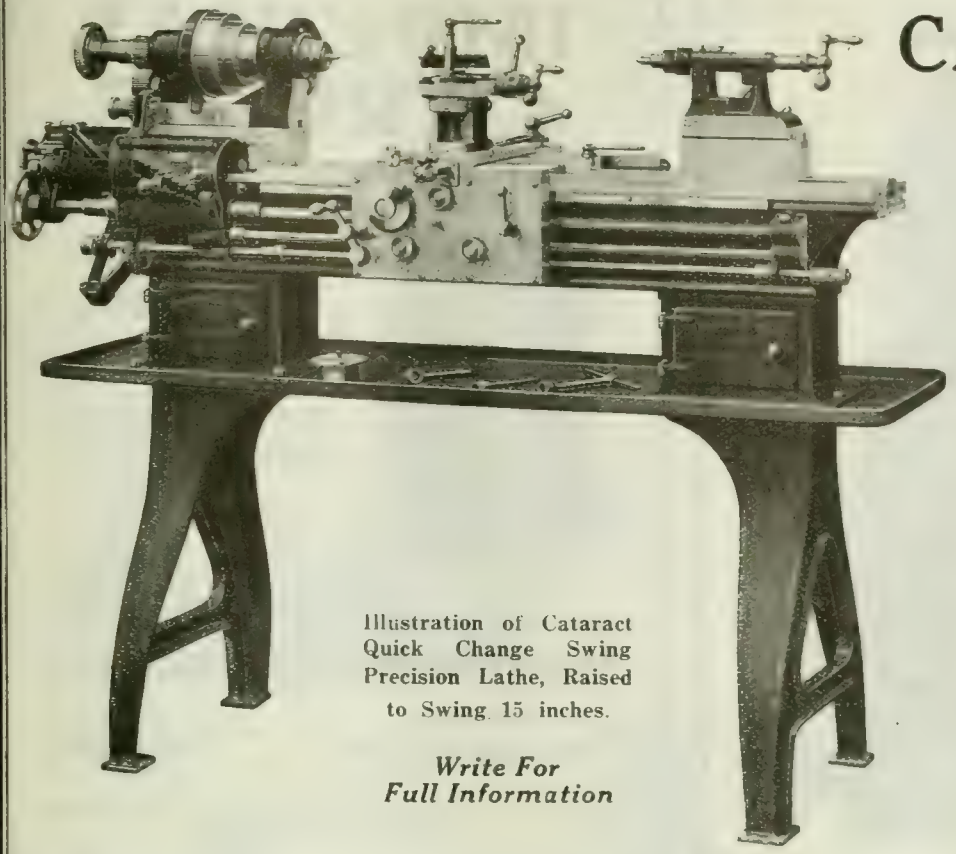

Illustration of Cataract Quick Change Swing Precision Lathe, Raised to Swing 15 inches.

Write For Full Information

CATARACT

QUICK-CHANGE PRECISION LATHE

Ideally designed for both ordinary and specially fine work. This Cataract lathe has accomplished so much in so many plants we'd particularly like YOU to know all the particulars of its unusual record.

Length of Bed .....52″
Total Length of Lathe .....65″
Distance Between Centres...28″
Swing .....9″ and 15″
Swing over Carriage 5½″ and 11½
Diameter of Lead Screw 1″ x 6 pitch
Diameter of Front Cover.2 1-32″
1 Diameter of Rear Bearing 1⅛″
Length of Spindle .....15″
Hole through Spindle.....1¼″
Draw-in Chuck Cap.1″ maximum

Hardinge Bros., Inc.
1770 Berteau Avenue
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STEEL CASTINGS

Mild Steel, High Carbon Steel, Manganese Steel, Chrome Steel

We are manufacturers of Steel Castings running from ½ lb. to 5,000 lbs. each and are in good position to furnish prompt deliveries at moderate prices. Try us with your next order.

The Wm. Kennedy & Sons, Limited, Owen Sound
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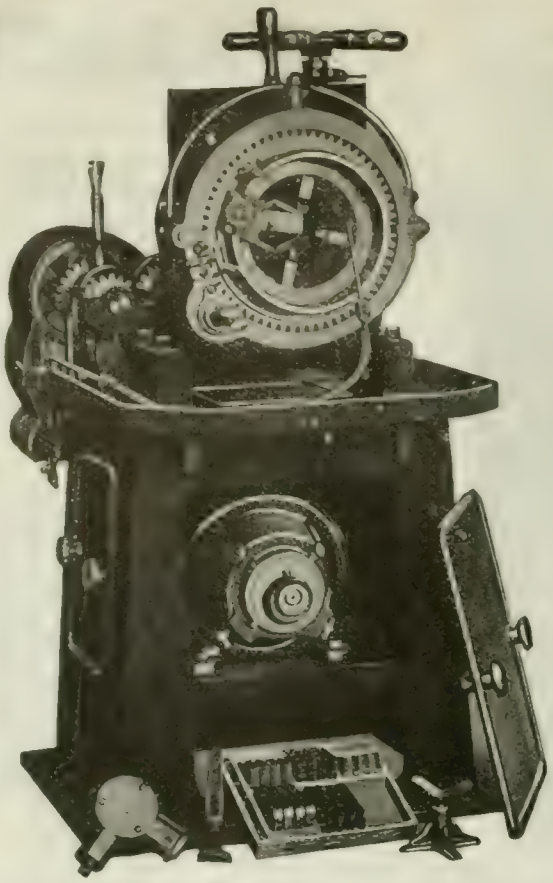

"Forbes Facts"

1. One man can do the work of six against the old stock and die method of cutting.
2. It is the only machine on the market with receding gear.
3. It is self-contained and motor-driven.
4. It is portable.

These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

The Curtis & Curtis Co.
115 Garden Street Bridgeport, Conn.

IMPERIAL CARBIDE

For Welding Cutting and Lighting

HIGHEST GAS YIELD
IMPERIAL CARBIDE
MADE IN CANADA

Manufactured by
Union Carbide Co. of Canada, Ltd.

Head Office:
Dominion Bank Bldg.
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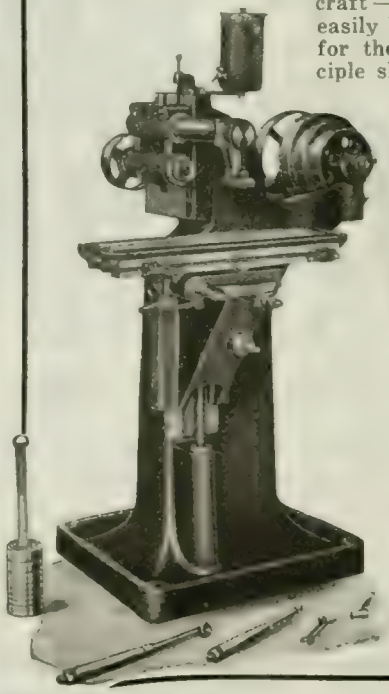
Large Stocks maintained at convenient distributing centres throughout Canada

Battleships steamed for the harbor when enemy submarines were about. That's where they belonged. The work of fighting the deep sea pests was left to smaller craft — they were quicker, more easily handled and more capable for the work. The same principle should apply in your shop practice.



U.S. MILLER

should be used for milling small parts. They too are quicker, more easily handled and more capable for this work than big tools. You can actually reduce your milling costs one-third to one-half on each part by the use of the U. S. Hand and Weight Miller. Finely built to combine speed, accuracy and durability.

United States Machine Tool Co.
CINCINNATI
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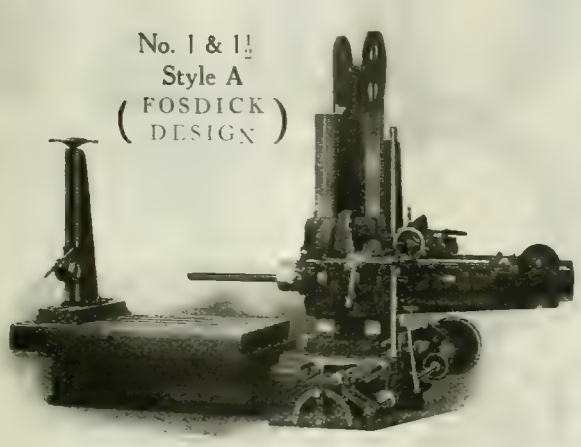
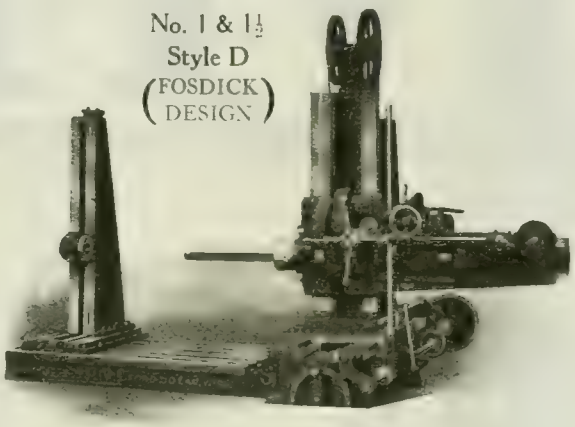
HORIZONTAL BORING DRILLING AND MILLING MACHINES

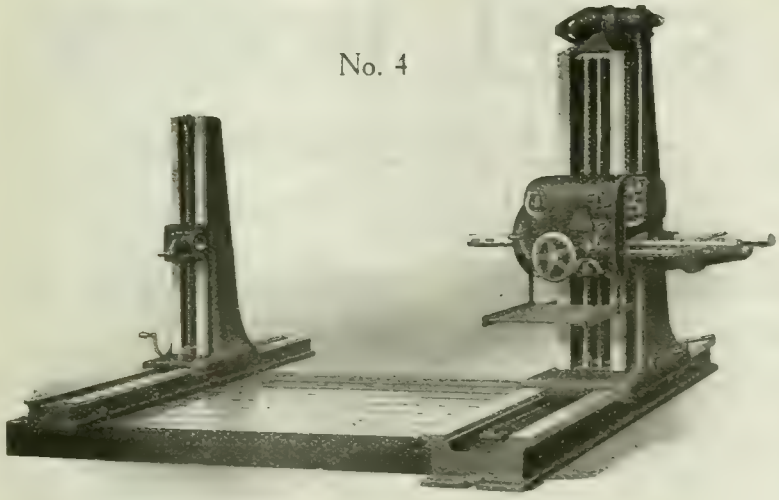
No. 1 & 1½ Style A (FOSDICK DESIGN)



No. 1 & 1½ Style D (FOSDICK DESIGN)



No. 4



	No. 1	No. 1½
Diameter of spindle	3½"	4"
Morse taper No.	5	6
Traverse of spindle	28"	30"
Vertical adjustment of head	36"	54"
Horizontal adjustment of column	36"	62"
Maximum, work bed to center of spindle (Style A)	44"	62"
Maximum, work bed to center of spindle (Style D)	76	76
Size of work bed	42"x72"	42"x120"
Speeds (4 to 255 R.P.M. geometrical progression)	12	12
Feeds, in all directions (.007 in. to ¼ in. per revolution)	8	8
Motor horse power	7½	10
Floor space	9'x15'	11'x19'
Total height of machine	8' 9"	10' 3"
Net weight (Style A machine)	16,000 lbs.	21,000 lbs.
Net weight (Style D machine)	17,000 lbs.	19,500 lbs.

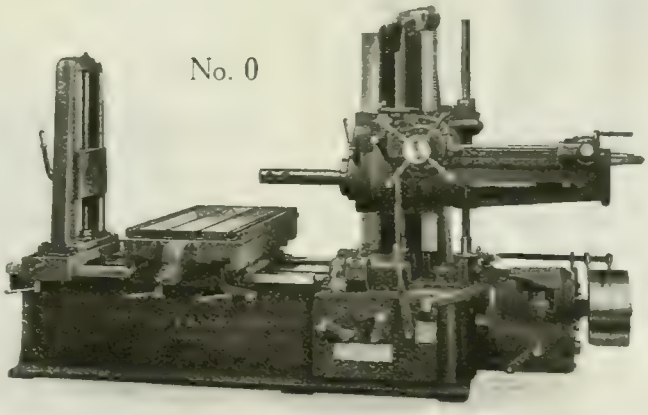
No. 4--FOR BIG WORK

Diameter of spindle	5"
Size of hole in spindle	Morse No. 6
Size of floor plate	8'x12'
Total height	13' 4"
Floor space required	16'x24'6"
Weight	50,000 lbs

No. 0---FOR PRECISION WORK

Diameter of spindle bar	2½ in.
Spindle bored to fit Morse Taper No.	5
Longitudinal travel of spindle	26 in.
Vertical adjustment of head on column	24½ in.
Size of table	24 in. x 50 in.
Traverse travel of table	30 in.
Longitudinal travel of table	32 in.
Approximate weight	7500 lbs

No. 0



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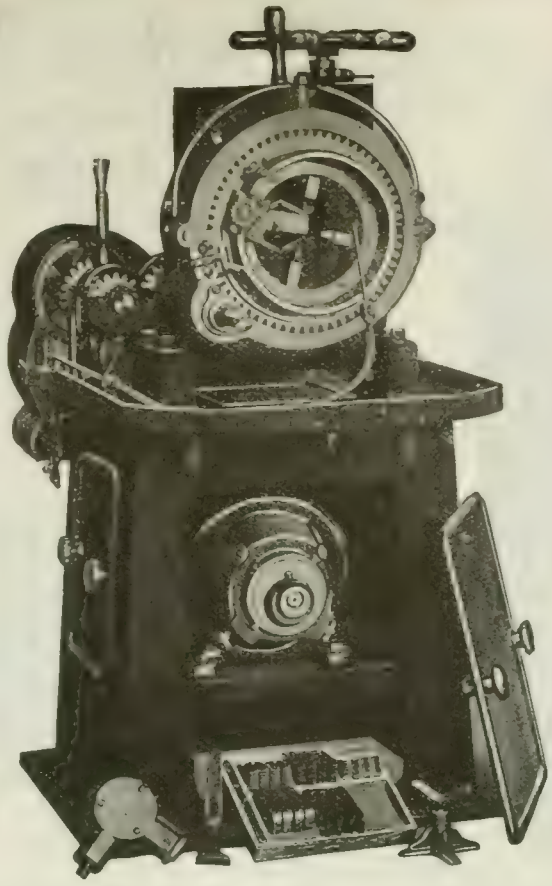
Giddings & Lewis Manufacturing Company, Fond Du Lac., Wis.

Foreign Agents: Canadian Fairbanks-Morse Co., Toronto, Montreal, Winnipeg, Vancouver; Fenwick, Freres & Co., Paris, Lyons, Liege, Zurich, Turin, Barcelona, Lisbon; Burton-Griffiths & Co., England; Wynmalen & Hausmann, Rotterdam; R. L. Scrutton & Co., Ltd., Sydney, Australia; Rylander & Asplung, Stockholm; Wilh. Sonesson & Co., Malmo.



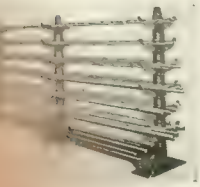
"Forbes Facts"

1. **One man can do the work of six against the old stock and die method of cutting.**
2. **It is the only machine on the market with receding gear.**
3. **It is self-contained and motor-driven.**
4. **It is portable.**

These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

The Curtis & Curtis Co.
115 Garden Street **Bridgeport, Conn.**

"NEW BRITAIN"
SHOP FURNITURE



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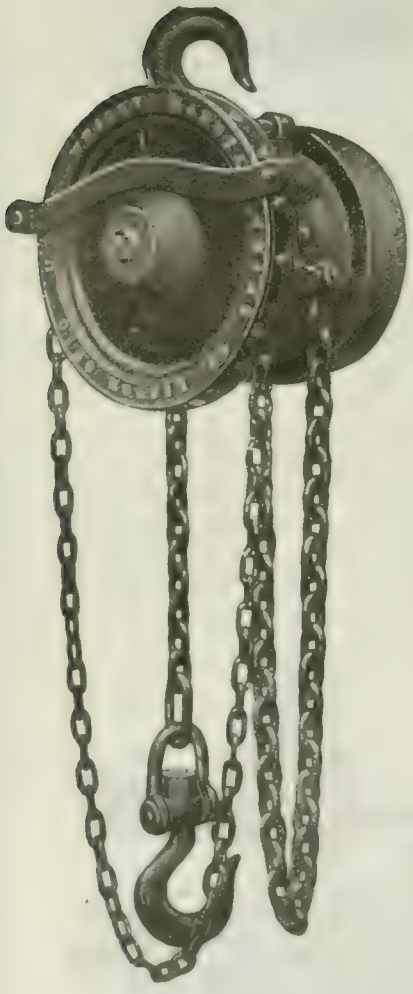

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The Right Solution for Your Lifting Problem

Wright Hoists will outlift and outlast any other block on the market.

Every load sustaining part is practically indestructible.

Constructed of steel and cast iron throughout.

Wright hoists raise loads quickly, easily and economically—they are the Hoists that NEVER FOUL, the hoists that will save money for your plant.

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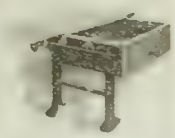


"NEW BRITAIN" SHOP FURNITURE

"NEW BRITAIN" SHOP FURNITURE

1919

What Has It in Store for You?

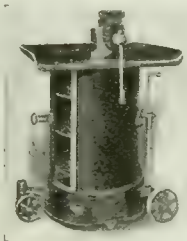
Two sound reasons for entertaining an optimistic view of the business outlook for the coming year offset each doubt that may be raised concerning it.

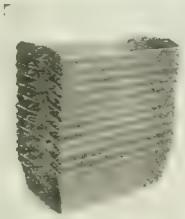
Upon its ability to adjust itself rapidly to changing conditions — rather than upon factors wholly outside its control—will depend the measure of the individual concern's success.

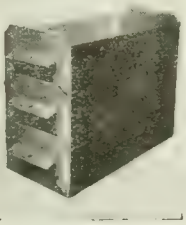
It will not be a time for relaxation of efforts toward production acceleration and waste elimination—on the contrary, the return of keen competition for the world's markets will call for even greater endeavors in this direction.

Every item of "New Britain" Shop Equipment is designed to promote the efficiency of the worker. Have you the catalog?

The New Britain Machine Company
New Britain, Conn., U.S.A.







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They are now equipped to handle everything in Oxy-Acetylene, Electrical and Thermit work. No job too small, and none too large.

OXY-ACETYLENE WELDING
DAVIS
APPARATUS
DAVIS BOURNONVILLE CO. NY

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Portable Generators	Carbide	Carbon Removers
Stationary Generators	Welding Rods	Portable Trucks
Welding Torches	Flux	Compressed Acetylene
Cutting Torches	Carbonite Rods	Electrolytic Oxygen
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9 Sheppard Street - Toronto, Canada

Electric Welding by Alternating Current

WELDING STEEL PLATE
HAMILTON BRIDGE WORKS, HAMILTON, ONT.

The

"MEPHISTO" WELDER

Operates on Alternating Current

Portable—Highest Efficiency—Lowest Operating Cost. No moving parts, therefore no wearing parts, no upkeep cost.

Reduces welding costs to minimum
Does not require expert to operate

The Arcwell Corporation of Canada, Ltd.

710 C.P.R. Building, Toronto

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That STOCO "CELOGLAS" SHATTER-PROOF LENS saved my sight

Your men will appreciate the protective advantages of this new **"Celoglas"** lens. It's the best possible protective lens in the best possible protection goggle.

The new **"Celoglas"** lens will be supplied only in Stoco safety goggles. It is composed of a sheet of thin celluloid cemented by an exclusive process between two clear glass lenses. It has practically the same percentage of visibility as a lens made entirely of optical glass, and a very much higher degree of eye protection.

"Celoglas" lenses may fracture through a severe blow from a flying missile, but they will not leave the frame and the glass will not fly into the eyes of the wearer. You can supply them to your employees with the assurance of perfect security.

Stoco safety goggles are supplied with either easy cable temples, as illustrated, or with elastic headbands, each pair in an individual carton. The price is the same with either cable temples or headbands.

Price with heavyweight optical glass lenses, $115.00 per hundred pairs.

Price with **"Celoglas"** shatter-proof lenses, $150.00 per hundred pairs.

Sample with either **"Celoglas"** or regular lenses will be sent without charge to any safety engineer or superintendent upon request.

STANDARD OPTICAL CO.
GENEVA, N.Y.

RHODES VERTICAL & HORIZONTAL SHAPER

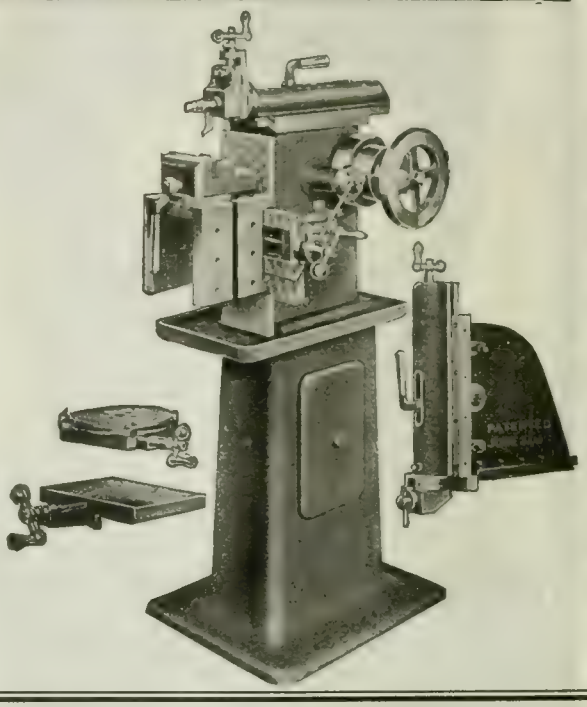
Saves Time and Expense

Not only does the Rhodes Vertical and Horizontal Shaper save time and expense, as compared with larger tools, but it does more accurate work and takes up less space.

Easily attached adjustments give the Rhodes an exceptionally wide range.

If you want the most economical and efficient production let a Rhodes Machine do your shaping and slotting, die-making, tool-making and similar light work.

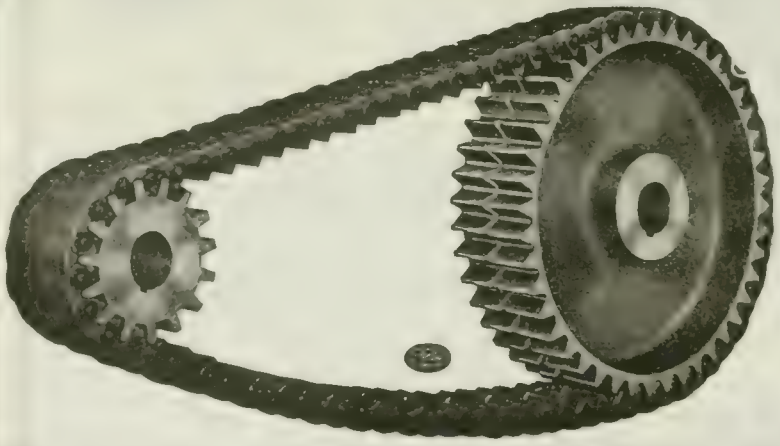
Rhodes Slotters and Shapers have many features which will interest you. Write.



The Rhodes Mfg. Company

Owned and operated by the Jacobs Mfg. Co.

HARTFORD, CONN., U.S.A.



Jones & Glassco (Reg'd)

ENGINEERS

MONTREAL AND TORONTO

Specialists in

POWER TRANSMISSION CHAINS

CANADIAN AGENTS FOR

"RENOLD"

Patent Silent and Bush Roller Chains

"MORSE"

Rocker Joint Silent Chains

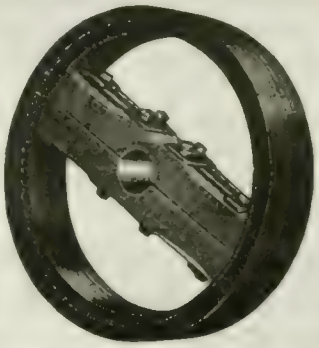
Chain Drives from ¼ H.P. to 5000 H.P. in successful operation

Write for particulars to

Head Office: St. Nicholas Building MONTREAL

Branch Office: 1204 Traders Bank Building TORONTO

BERNARD WOOD SPLIT PULLEY



Why waste power that costs money?

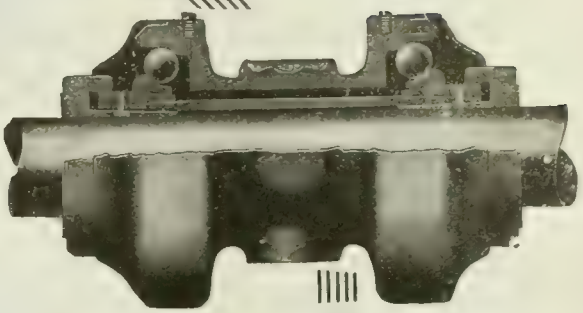
This can be effectively prevented by using "Bernard" Wood Split Pulleys.

Let us quote on your requirements.

The A. Bernard Industrial Company, Fortierville, Quebec

Manufacturers of High Grade Power and Transmission Appliances

Chapman Double Ball Bearings



Sectional view of Chapman Double row ball bearings.

Pay You to Adopt Them

Are you using babbitted bearings in your power transmission machinery? The power you are losing through friction by their use would in two years' time pay for an installation of **Chapman** type of Ball Bearings. This is a fact proven by their installation in over 3,000 plants in Canada and United States.

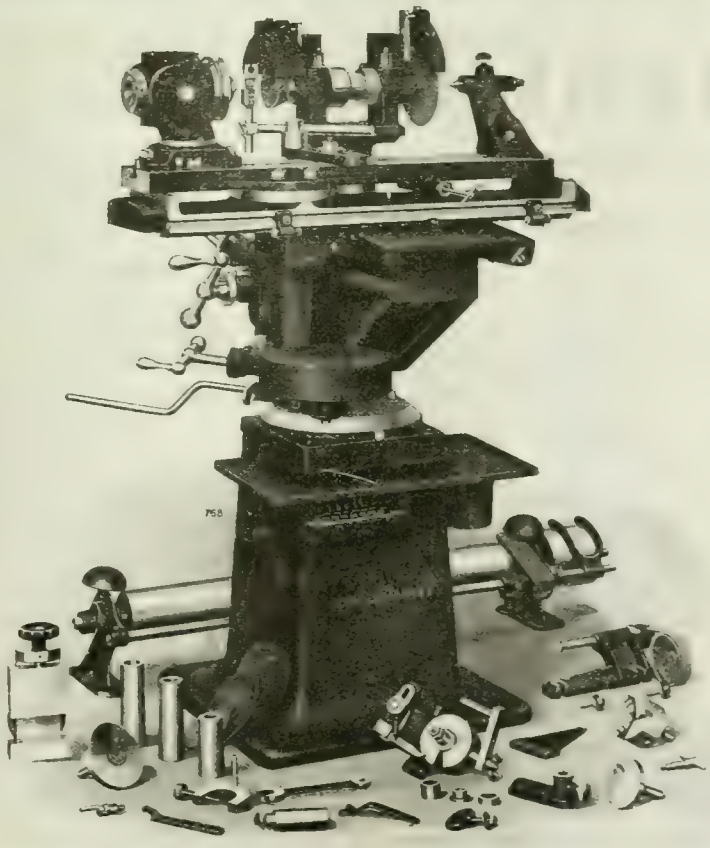
Chapman Double Ball Bearings practically eliminate friction, and they require lubrication only once or twice a year—therein lies the secret of their economy.

One of the many types of frames we fit.

Chapman Double Ball Bearing Company of Canada, Ltd.

339-351 SORAUREN AVE., TORONTO
Room 408 Shaughnessy Bldg., Montreal; Transmission Ball Bearing Co., Inc., 1050 Military Rd., Buffalo, N.Y.

Have you received a copy of Catalog 3-G? Pay to send for one if you haven't.



Investigate Your Cutter-Sharpening Facilities

Our wide experience in milling has proved the necessity of having exactly the correct clearance on cutters. But cutter grinders were too incomplete to insure reproduction of the right clearance on repeated grindings. We set ourselves the task of solving this difficulty. The 40 per cent., 50 per cent. or 60 per cent. increased output that proper clearance means was certainly worthy of our best efforts. In the No. 1½ UNIVERSAL CUTTER AND TOOL GRINDER we offer you the result—a simple, correct clearance angle feature.

The machine carries a graduated dial on its headstock spindle from which the clearance angle for all cutters may be read direct.

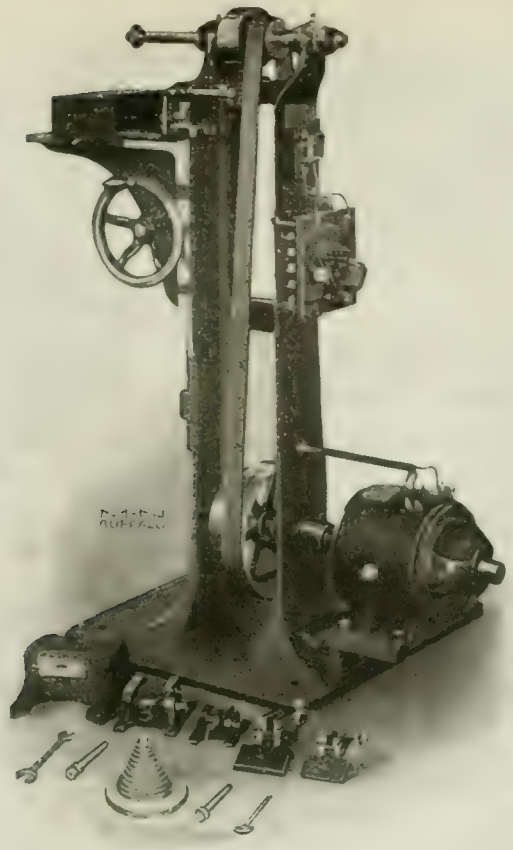
As a result of obtaining this correct clearance angle the feed may be greatly increased, the cutter cuts as it was designed to; the tendency to chatter is removed—and you get greater efficiency from your millers.

Send for the bulletin and get the whole truth of the matter.

Cincinnati Milling Machine Co.

Cincinnati, Ohio, U.S.A.

Canadian Agents: H. W. Petrie, Ltd., Toronto, Ont.; H. W. Petrie of Montreal, Ltd., Montreal, Que.; General Supply Co. of Canada, Winnipeg, Man.



The "MODERN" Die Chaser Grinder

Let Your Die Troubles End Right Here

Why let Die Trouble stand between you and maximum production?
In the

Modern Die Chaser Grinder

you will have a machine that does away with die trouble—because its output is **marvellously eccentric.**
Made for belt drive or a complete motor-driven unit. Special attachments for grinding Spring Dies, Pipe Dies, Reamers, Taps, Hobs, Spiral and End Mills, Milling Cutters, etc.; can be furnished with the regular equipment.

For Fast Accurate Work

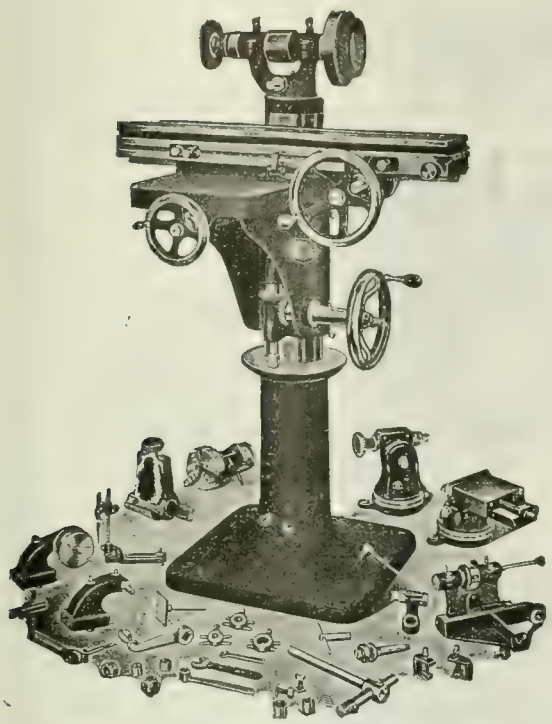
Bulletin C. G. will give you full details.
We would also be pleased to send you full particulars re **"Modern" Self-Contained Grinding Machines.** Tools splendidly adapted to meet the present demand for large production.

Modern Tool Company

Main Office and Works: State and Peach Streets, Erie., Pa., U.S.A.

Canadian Agents: Rudel Machinery Co., Toronto and Montreal

New York Office: - 50 Church Street
Chicago Office: - 32 N. Clinton Street
F. Wesley Parker, Resident Engineer and Export Agent, 2 Rector Street



The Greenfield Universal Grinder

For General Tool Room Work

This Grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,
GREENFIELD, MASS., U.S.A.

Some original features of the new LANDIS Boring, Milling and Drilling Machine

LANDIS

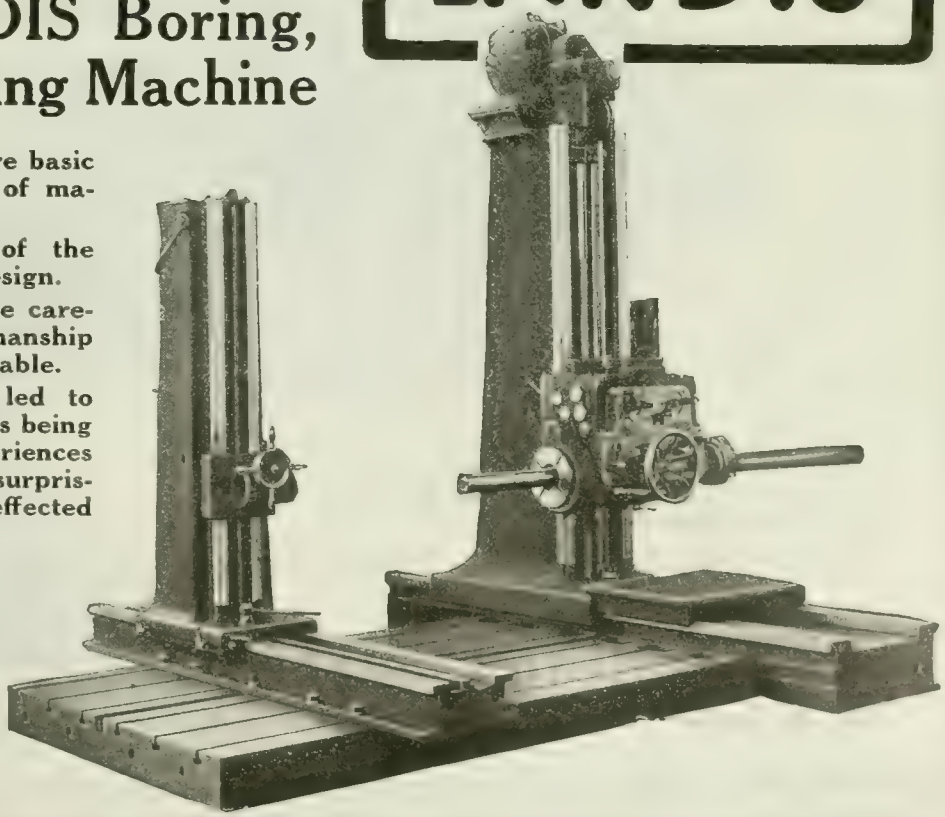
This machine can perform more basic operations than any other type of machine tool.

The concentric screw feed of the spindle is exclusively LANDIS design.

The gearing could not be more carefully enclosed; and the workmanship and materials are the best obtainable.

These facts have inevitably led to recognition of the new LANDIS as being in a class by itself, while the experiences of users have demonstrated that surprising increases in production are effected wherever it is installed.

Why not learn the full details. Catalog on request.



Landis Tool Company
Waynesboro, Pa.

New York Office, 50 Church St.

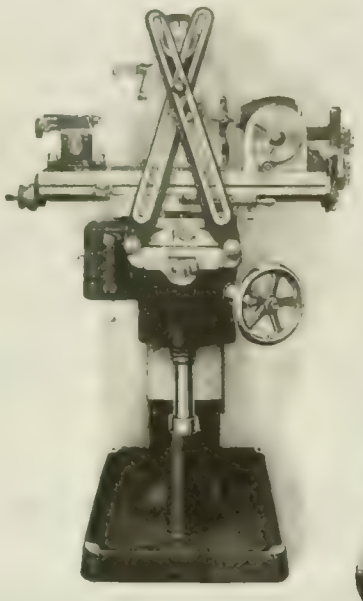
Agents:
Dewstoe Machine Co., Birmingham, Ala.; Harron, Rickard & McCone, San Francisco and Los Angeles.

TRADE FOX MARK
REGISTERED

MILLING MACHINES

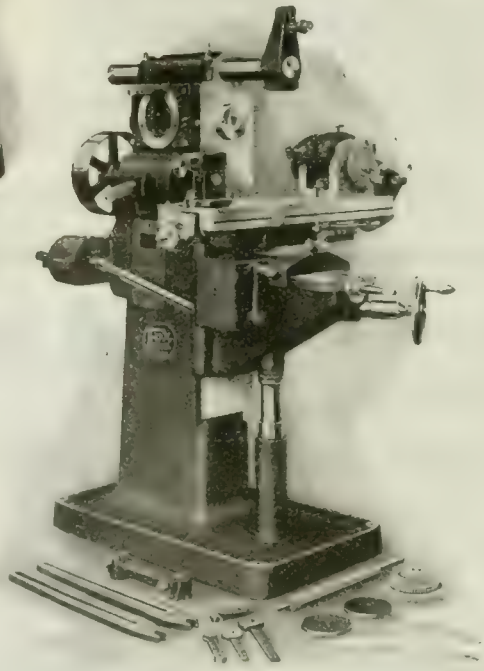
FOR

Rapid Production of Motor Parts



The **demand** for increased production **requires tools** of **great strength** and **durability**; the Fox 2-A Universal Milling Machine illustrated has met this demand, and is being used wherever extreme accuracy and quantity production are required.

The machine has a universal table, spiral cutting attachment, 10″ Dividing Head with 6″ Universal Chuck, making it a machine **especially adapted for Tool Room Work.**



The **United States Government** is using this machine in its various **repair shops** for **Aeroplane Motors.**

You should be using this tool to help the production of parts necessary for the prosecution of the war.

Specifications—No. 2-A Miller.

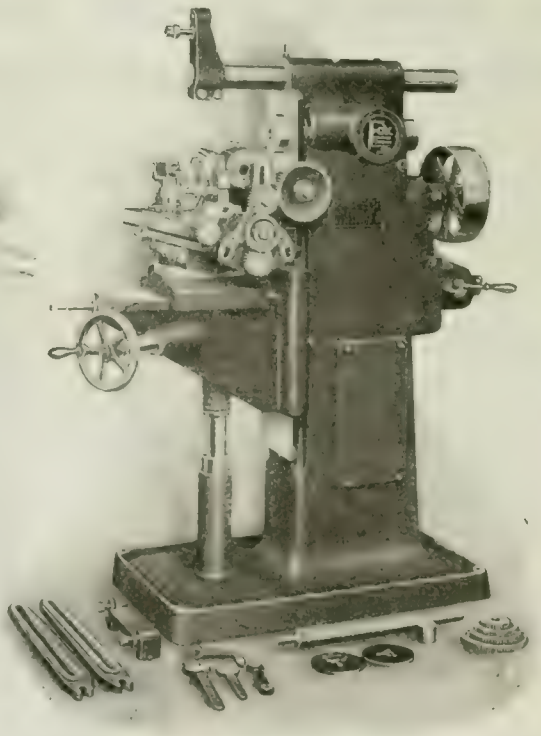
Spindle speeds 12
From 21 to 423 r.p.m.

Table feeds 6
From .317″ to 2.79″ per min.

Table 8½ x 27″
Long. feed (power) 26″.
Vertical feed (hand) 13″.
Trans. feed (hand) 8½″.

Drive...Single pulley 10 x 3″ running 250 r.p.m.

Gears — Hardened steel.
Weight .....1,500 lbs.



We build this same machine with a plain table, omitting the spiral cutting attachment and Dividing Head.

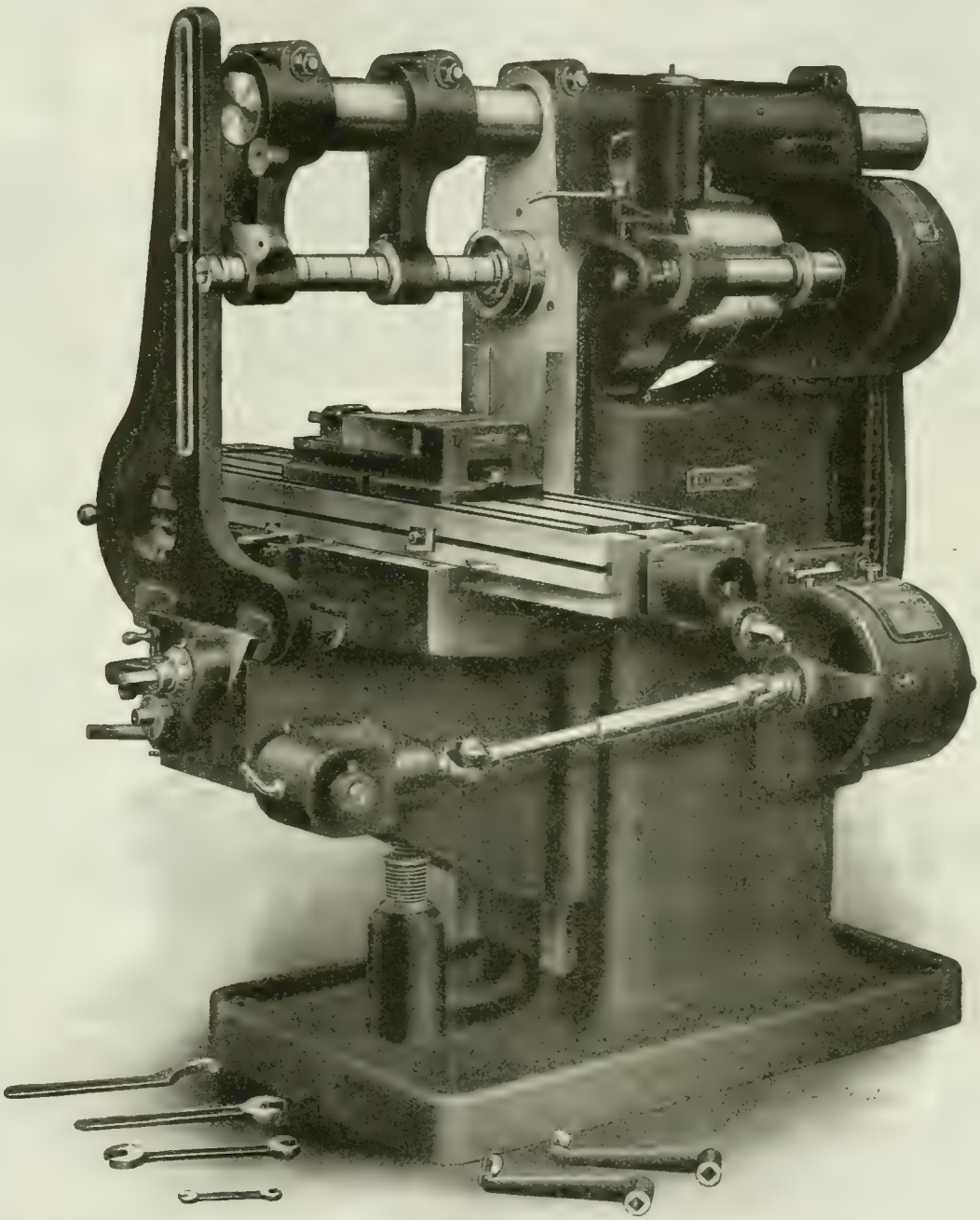
Our No. 1 type machine has a four-step cone drive, and while being a lighter machine is a "bear" for work. This is **proven** by **the hundreds** of **them in the largest munitions plants.**

We also build the Fox Multiple Spindle Drilling Machines.

FOX MACHINE COMPANY

1047 W. Ganson St., Jackson, Michigan, U.S.A.

KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

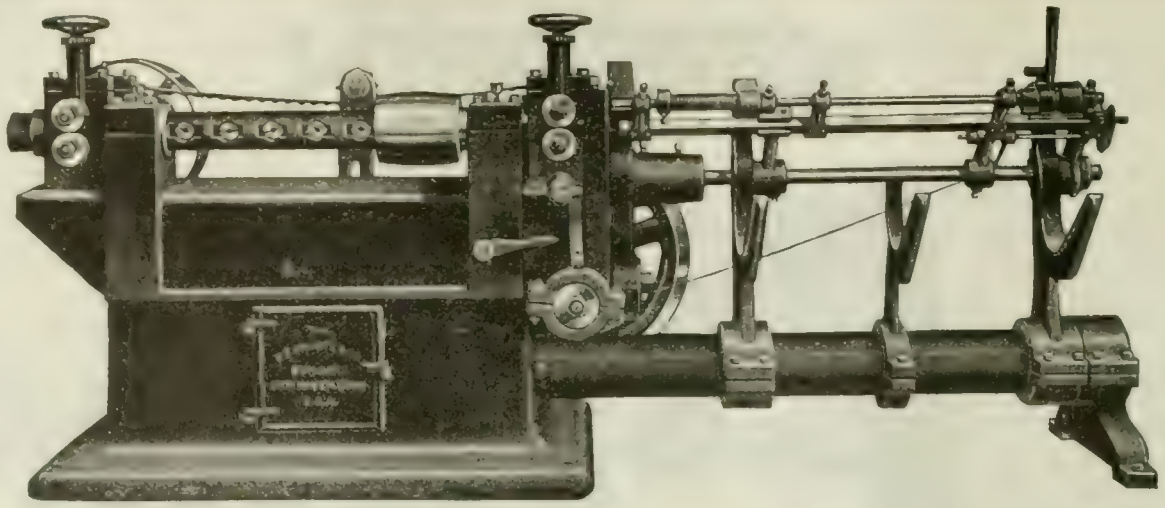
Double Back Geared

A heavy, powerful tool with double back gears and wide driving belt running on a three step cone of large diameter. Our Catalogue "B" describes and illustrates many notable features of the Kempsmith Miller. Write for a copy to-day.

THE KEMPSMITH MANUFACTURING CO.

MILWAUKEE, WIS., U.S.A.

FOREIGN REPRESENTATIVES:—Barandiaran & Co., 3 Alameda, San Sebastian, Spain. Bevan & Edwards, Pty., Ltd., 117-29 King St., Melbourne, Australia. Edgar Bloxham, 12 Rue du Delta, Paris, France. D. Drury & Co., 1-2 Central House, Main St., Johannesburg, South Africa. Roku-Roku-Shoten, 3 Shinsakanacho, Kyobashiko, Tokyo, Japan. Nielsen & Winthers, Blegdamsveg 60, Copenhagen, Denmark. Parke & Lacy Co., Ltd., 60 Clarence St., Sydney, N.S.W., Australia. Selson Engr. Co., 19 Via Botero, Turin, Italy, and 85 Queen Victoria St., London, E.C., England. Spliethoff, Beeuwkes & Co., Leuvehaven, W.Z. 159, Rotterdam, Holland.



Perfect Wire Straightening Quickly and Profitably Done on Our

Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we'll be glad to send you a copy.

THE F. B. SHUSTER CO., New Haven, Conn.

FORMERLY JOHN ADT & SON ESTABLISHED 1866

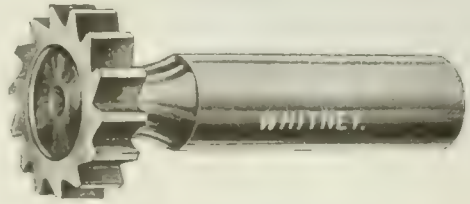
ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

"WHITNEY"

KEY-SEAT CUTTERS

For the Woodruff System of Keying

GET OUR PRICES



We have learned from years of experience how to make these Cutters so as to insure high accuracy combined with lasting service. Immediate shipment in either carbon or high-speed steel.

The Whitney Mfg. Co., Hartford Conn.

Chains, Keys and Cutters, Hand Milling Machines

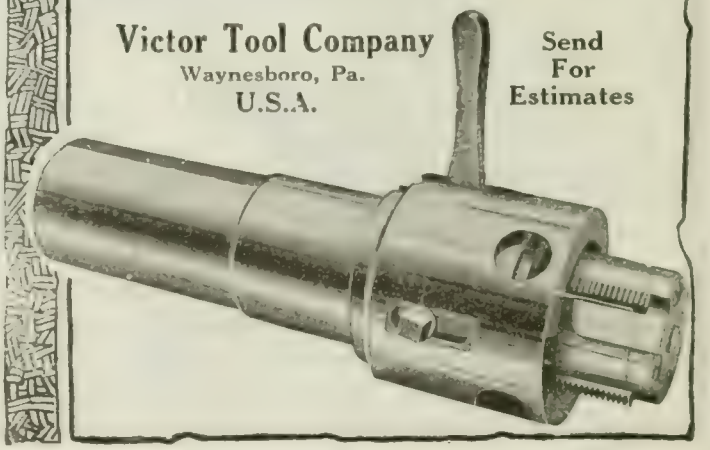
We wanted something original—this is what we got

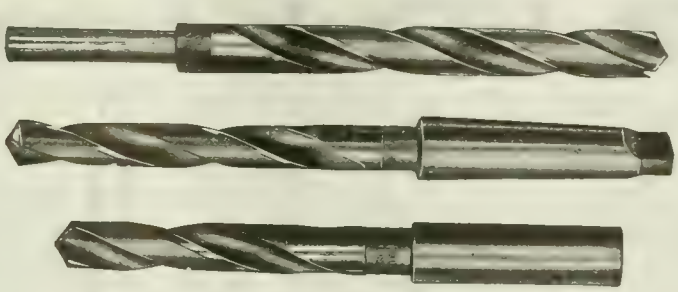
"BOTH these operations and half another—I'll show you later—completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

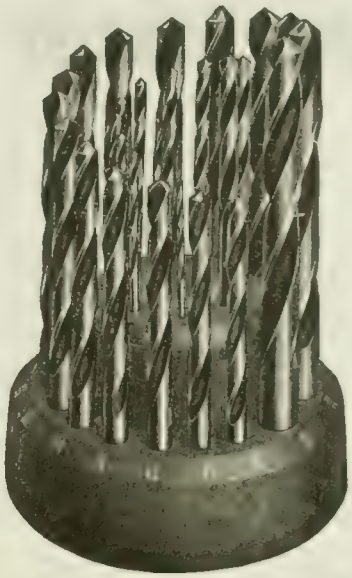
It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

Send For Estimates



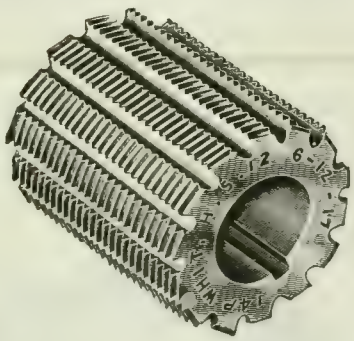




BUTTERFIELD

TWIST DRILLS, GEAR AND MILLING CUTTERS

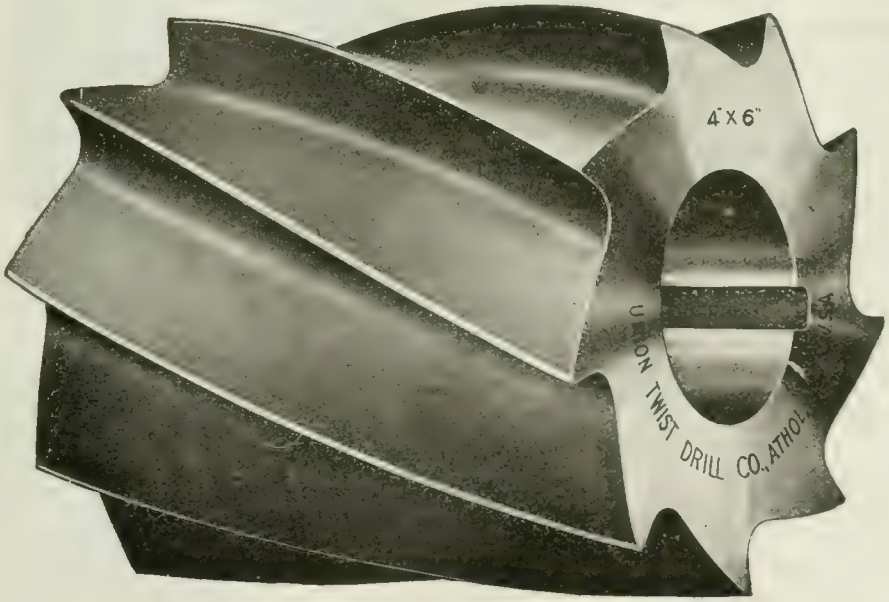
(Carbon and High Speed Steel)



Their ability to serve accurately and long equals that of Butterfield Taps, Dies and Reamers—the sincere praise of a thousand users wouldn't be a better recommendation.

They are the happy result of a great combination of specially trained men and the finest special machinery.

OUR COMPLETE LINE OF DRILLS AND CUTTERS ARE FULLY DESCRIBED IN OUR CATALOG A. Be sure to send for a copy.



Butterfield & Co., Inc., Rock Island, P.Q.

Toronto Office, 220 King St. West

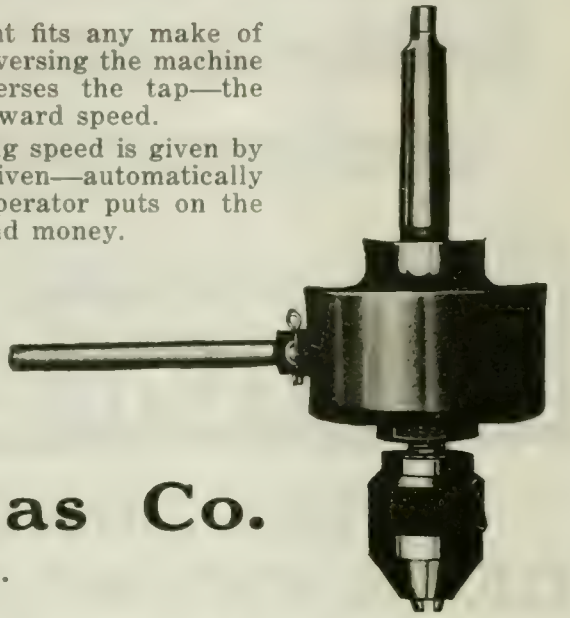
If any advertisement interests you, tear it out now and place with letters to be answered.

A Fitter Fit Is Impossible

The "B-T" Reverse Tapping Attachment fits any make of drill press. It eliminates the necessity of reversing the machine spindle. Simply raising the spindle reverses the tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of the tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle. It saves taps, trouble, time and money.

Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.

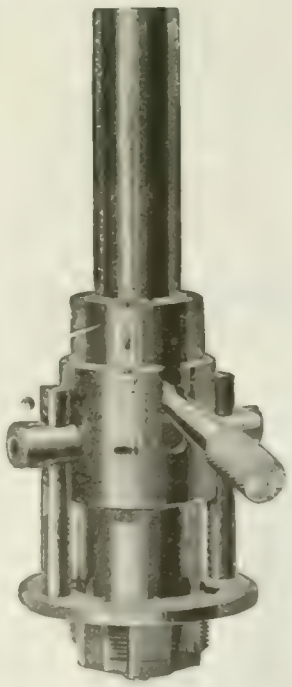


Get the details—In our Bulletin
Write to-day.

Bicknell Thomas Co.

Greenfield, Mass., U.S.A.

"B-T" Reverse Tapping Attachment



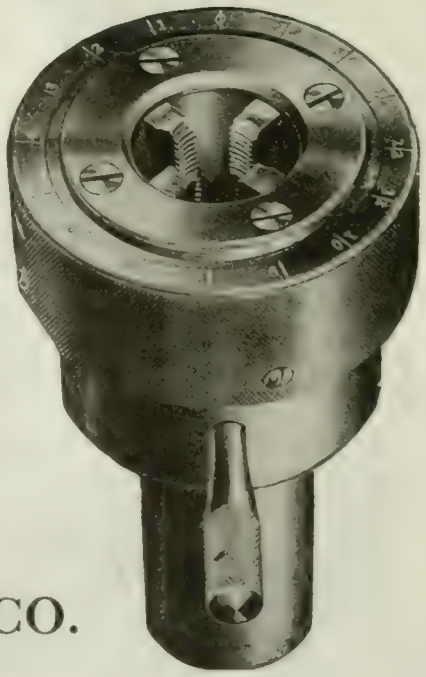
The Murchey Way!

The "Murchey Way" is to keep well in advance in the matter of all things pertaining to the **accurate** production of their well-known **Collapsing Taps** and **Self-Opening Dies.**

Every tool that comes out of the Murchey shop is the very best that modern machinery, modern ideas and years of experience can make it.

Murchey Taps and Dies last longer, do better and quicker work than ordinary tools. They combine cost-cutting features seen on no other tools of their kind.

Sixteen years of experience in making Collapsing Taps and Self-Opening Dies places us in a position where we can make valuable suggestions on special threading tools. Write.



MURCHEY MACHINE & TOOL CO.

75 PORTER STREET, DETROIT, MICH.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. - - 16 Rue Fenelon - - Paris, France

H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.

New Haven - Conn.

Scroll Chucks
Three-Jaw Universal Geared

The best material obtainable is used in the manufacture of KNIGHT Chucks. First grade gray iron bodies and backs, steel scrolls, pinions, jaws and wrenches. These chucks are thoroughly tested and inspected as to workmanship, position, synchronization and finish before leaving the factory.

Knight Metal Products
LIMITED

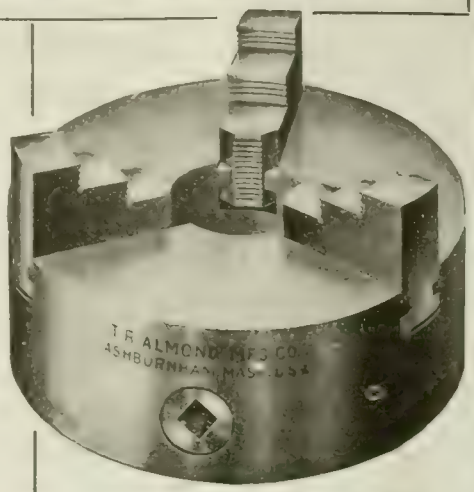
119 West Adelaide Street
Toronto, Ont., Canada

Cable: "Knightmetl"; Code, Western Union

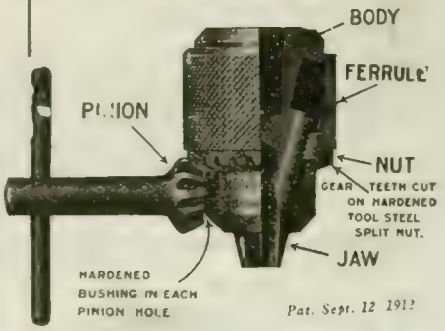
If any advertisement interests you, tear it out now and place with letters to be answered.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6, 7½, 9 and 12.



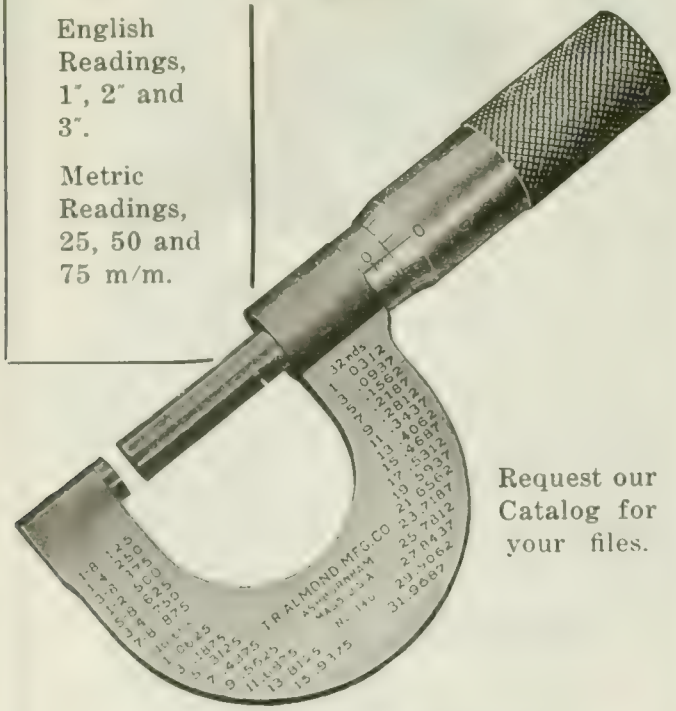
Geared Nut Drill Chucks, in various capacities, 0" to 1".



Micrometer Calipers—

English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.

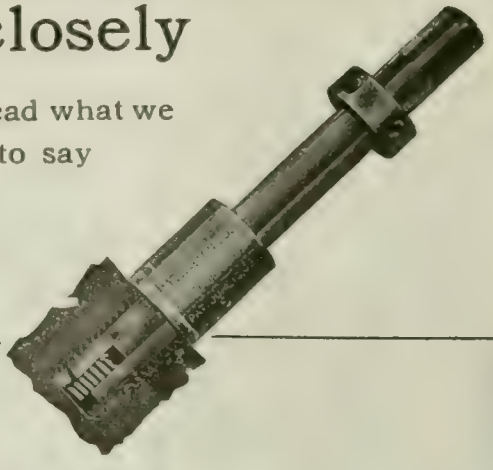


Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.

Look at this again —closely

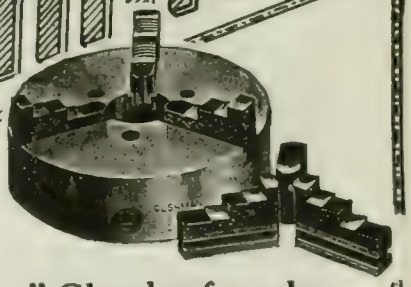
and read what we have to say below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.
Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

Cushman Chuck Co., Hartford, Conn.

CHUCKS

"We Have Eliminated Two Operations in this Cleaning Process".....

And we did it with Oakite Platers' Cleaner.

"It was always a difficult job to clean these steel parts and die castings before nickel-plating them.

"We had to scrub them and then copper-plate them to get them right—and then they were not as good as these pieces.

"Now we clean them in Oakite Platers' Cleaner, and just look at that plate—it's perfect!

"That's great work—and Oakite Platers' Cleaner cuts out scrubbing and copper-plating.

"Whenever I am up against a hard cleaning problem, I always send for the Oakite man."

This Advertisement is one of a series based on actual occurrences

OAKITE MANUFACTURED BY OAKLEY CHEMICAL CO. 44 THAMES STREET · NEW YORK

The PHOTOSTAT—A Thrift

TRADE-MARK REGISTERED

The Troy Laundry Machinery Co., Chicago, says:

"Our machines going to the United States Army 'over there' must be transported 'knocked down.' That means setting them up by inexperienced men upon their arrival 'at the front.' What suggested itself as a real problem has been solved easily by the PHOTOSTAT—and has eliminated lost time, motion, and labor for the soldiers who do the 'setting up.'

"We make photographic copies of all parts—and their assembly. Then the soldiers merely take these photographic copies as a set of directions—and the job is completed in no time.

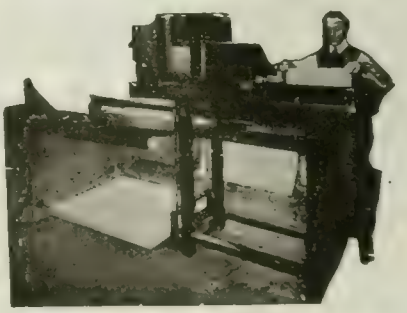
"But this is just one use we make of this real efficiency device. Here are a few others:

1. Specifications from the Government.
2. Samples of inventions to be tried out in our factory.
3. Parts of catalogs—which would take a stenographer hours to copy.
4. Cuts of machinery that are sent with bids.
5. Parts to be repaired when the original part can't be spared.
6. Posters from the Government reduced and sent to salesmen for advertising.
7. Illustrations for wiring in setting up machines.
8. Letters containing contracts.
9. Blue prints and tracings.

"We hope in the near future to use the machine for all routine work of the factory."

The PHOTOSTAT, which is manufactured by the Eastman Kodak Co., is a combined camera and copying machine. The copy is made directly onto a roll of paper. No intermediate glass plate or film or other negative has to be made. By copying thus directly onto the paper, the copy is made very quickly and at a low cost. Also the copy is a facsimile of the original, so that there can be no mistake in it. The print is developed and fixed right in the apparatus itself; this part of the process, as well as the focusing and exposing, all being mechanical. The print is then removed to a tank of running water, in which it is washed free from chemicals. Finally the print is taken from the water and dried and is then ready for use. The whole process is a rapid one, the average speed per print being from one to five minutes.

The PHOTOSTAT makes rapid, inexpensive and facsimile copies of Pencil Drawings, Ink Drawings, Tracings, Blue Prints, Maps, Sketches, Documents, Letters, Telegrams, Specifications, Data Sheets, Tabulations, Record Cards, Pages from Books, Insurance Records, Shipping Lists, Reports, Contracts, Illustrations for Salesmen, Cuts and Drawings for Advertising, etc., etc.



This cut shows the operator examining copy of a 36-in. drawing which he has just made in less than a minute.

A small book giving detailed description will be sent to you upon request to the

COMMERCIAL CAMERA COMPANY

ROCHESTER, N.Y.

Chicago, Ill. Philadelphia, Pa. New York, N.Y. Providence, R.I. Washington, D.C.

AGENCIES:
ALFRED HERBERT, LTD., COVENTRY, ENGLAND
SOCIETE ANONYME ALFRED HERBERT, PARIS, FRANCE
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Standard Pressed Steel Co., Philadelphia, Pa., U.S.A.

Distributors for Ontario:

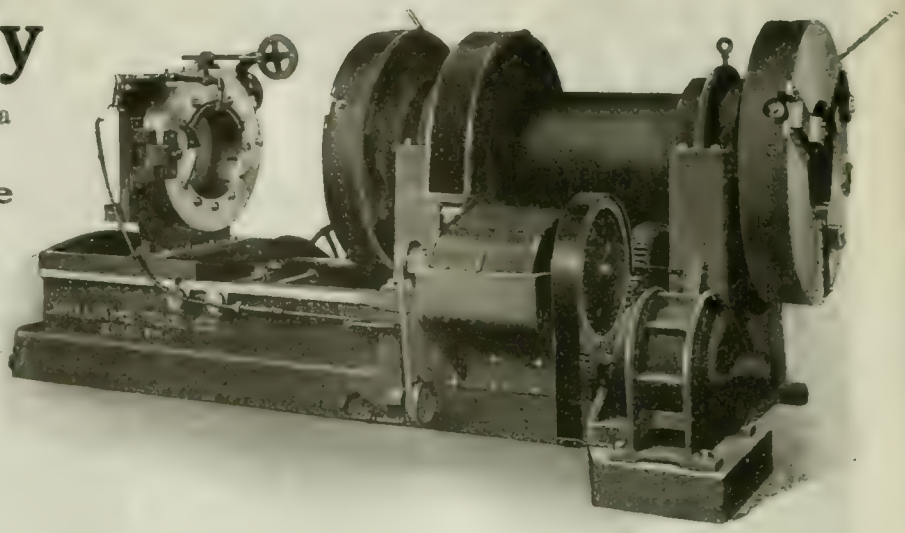
H. W. Petrie, Ltd., Toronto, Ont. and A. R. Williams Machinery Co., Ltd., Toronto, Ont.

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

Williams Pipe Machine

that's on the job.
For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.
It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.
The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie [illegible] Penn. - U.S.A.

Canadian Agents: The A. R. Williams Machinery Co., Ltd. Toronto Canada

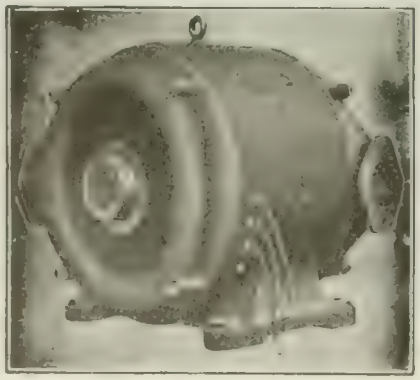
European Agents: Universal Machinery Corp. London - England

The Lancashire Dynamo & Motor Company, of Canada, Limited

49-63 Niagara Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS'. { INSTRUMENTS / RECORDING GAUGES



PIPE VENTILATED A.C. MOTOR
FOR VERY DIRTY PLACES

Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

Metal Lockers for Clothes.

Steel Shelving for all purposes.

Drop a line for full details

Canada Wire & Iron Goods Company

Hamilton, Ontario

Eastern Representative: H. E. O. Bull, 184 Mance St., Montreal, Que.

Weld Your Sheet Metal Parts with ARMCO IRON Filler Rods

The economic saving and desirability of welded seams and fittings over the older method of riveting is now beyond question. The Electric Welding Committee of the U. S. Shipping Board conservatively estimates the saving on hull plating and other vital ship parts at 25 per cent. On minor ship parts, the labor saving is estimated to be from 60 to 70 per cent.

In the manufacture of boilers, plate shells, pressure containers, sheet metal pipe and the like, the saving in time, labor, material, the reduction in weight, etc., all indicate that welding is the approved construction for the future.

ARMCO IRON is a particularly desirable filler for welding seams of and attaching fittings to, sheet metal surfaces and containers for the following reasons:

1. Uniform purity and metal structure that produce welds of the highest efficiency and permit the standardization of repetitive welding operations with absolute reliability of the finished welds.
2. Free flow and action under heat, that make the operative's work easy and give him greater confidence.
3. The standardization of one metal composition in two tempers to meet all ordinary iron and steel requirements. ARMCO IRON rods for oxy-acetylene are the same as for electric welding except the temper, which for electric is harder to work equally well under the higher temperatures.
4. Readily obtainable in all popular sizes from conveniently located supply depots in all industrial centers.

Write for a trial shipment, and if you want free advice on welding subjects, your questions will be answered by engineers who have made welding a life study and who know from first hand experience what is being done in this line

PAGE STEEL & WIRE CO.

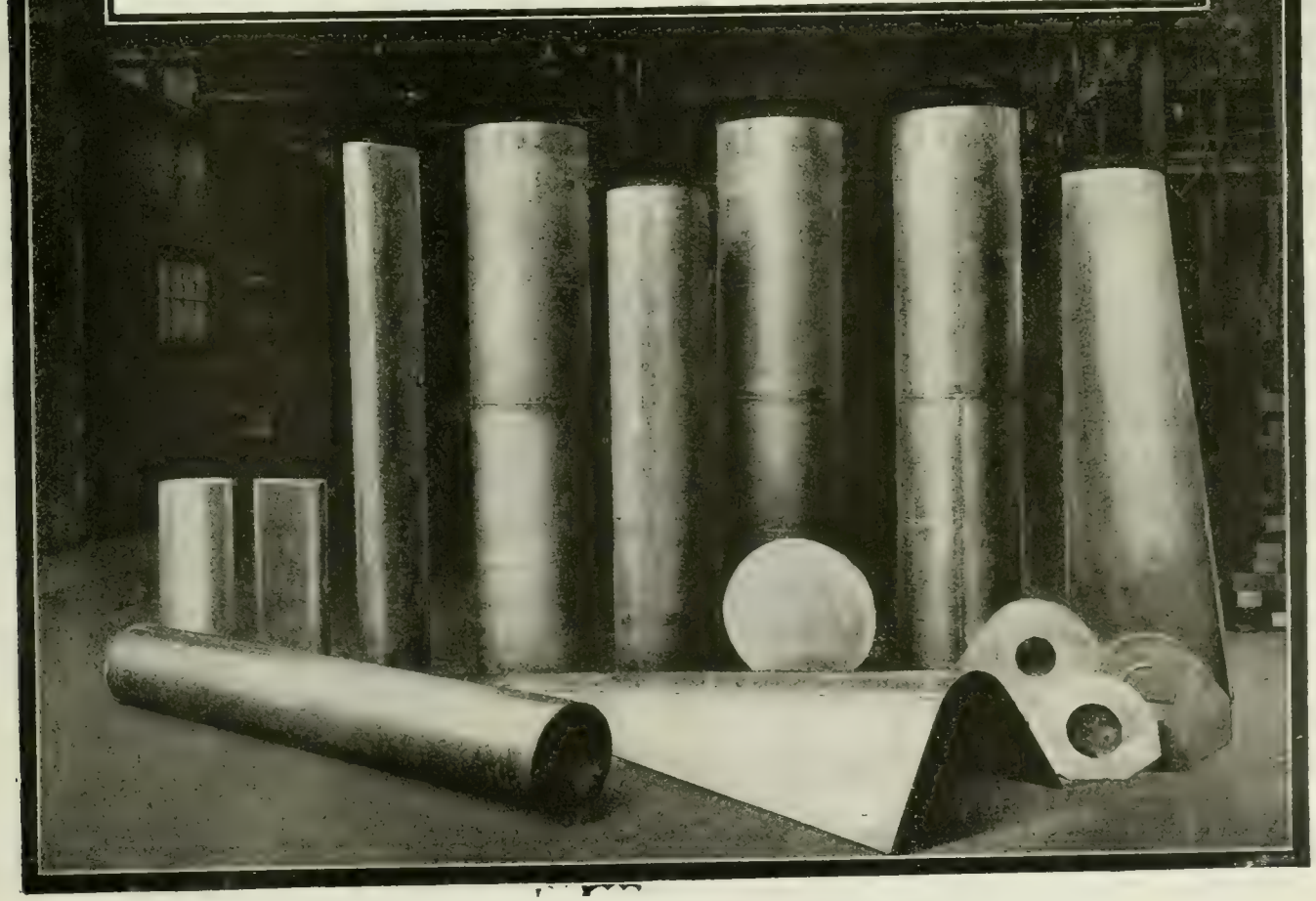
Established 1883 as Page Woven Wire Fence Co.

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO IRON Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis, Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence, Machine Guards, Tool and Stock-room Partitions; Architectural Iron.

Plants: Monessen, Pa. and Adrian, Mich.

Sales Offices: 30 Church Street, New York

Western Representatives: Steel Sales Corporation, Chicago 31



GARVIN

No. 12 Plain Milling Machine-Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments .....18 x 6 x 15 in.

For Further Information ASK YOUR DEALER or WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

Smalley General Thread Milling Machines

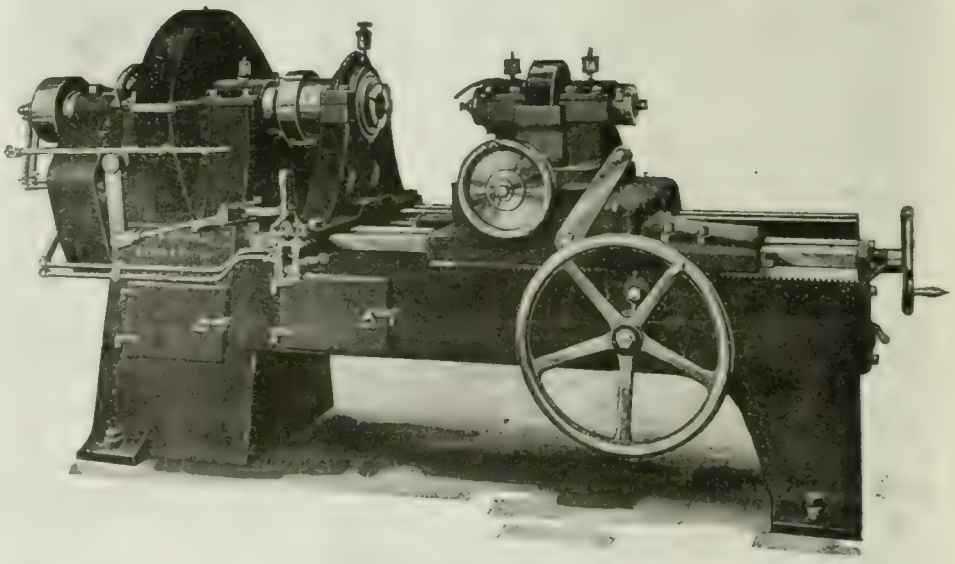
Two speeds—in one minute milling 2 to 12 inches or turning 15 to 30 feet.

Don't misunderstand **Peace.** It is not a signal to put on the brakes.

Now, if ever, your shop needs Smalley General Thread Milling Machines to meet commercial rivalry ahead. They are guaranteed to increase output 50%.

Speed extraordinary while on extremely accurate work won Smalley General Thread Millers the unstinted praise of the largest producing shell-makers on this continent. The same ability will prove a profitable advantage in your commercial shop.

Write for Bulletin.

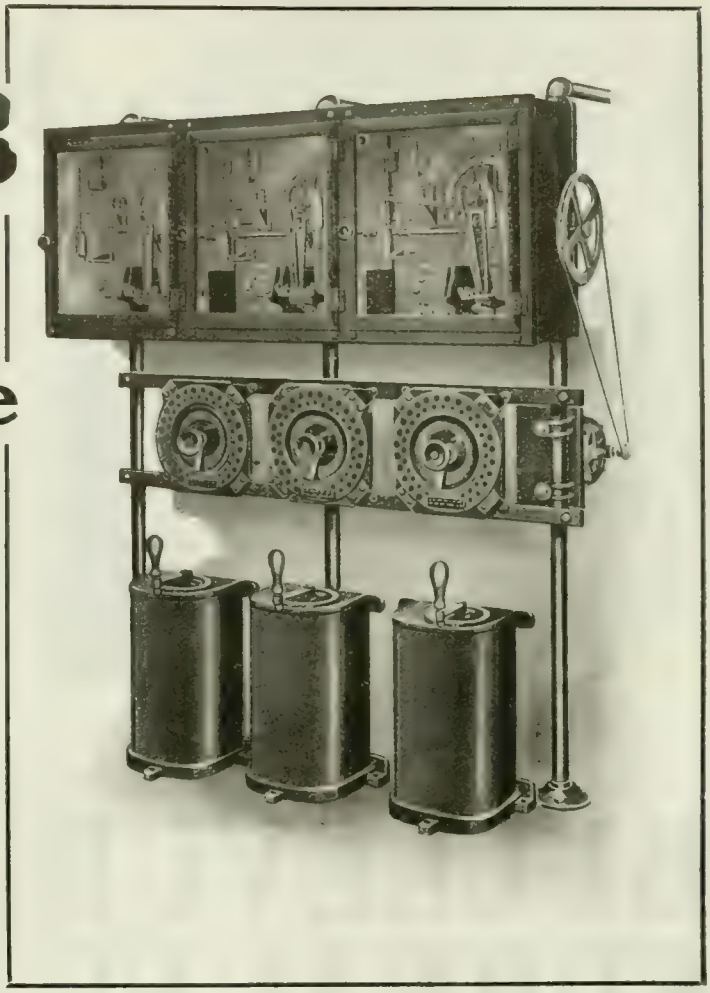


Smalley General Co., Inc.

BAY CITY, MICH.

Canadian Agents:
RUDEL-BELNAP COMPANY, LIMITED
Montreal and Toronto

New Type B THURY Electric Furnace Regulator



A Regulator which will give a perfect control on an electric furnace operating on steel or alloys.

A Regulator in keeping with the advanced methods of electric furnace practice of to-day.

It allows of a wide range of power being used, so necessary in the melting or refining of steel.

Rugged and simple in construction, when once set it can be operated with a minimum amount of attention, and the operator can forget his power worries and give his whole attention to the steel, so increasing production at a low power cost.

Electric Steel Furnaces

The Electric Steel Furnace during the last few years has demonstrated its capabilities to produce castings which have superior physical properties, and at a cost which compares very favorably with open-hearth castings.

For the very best results the furnace must be complete with all the most modern operating devices, so that one heat follows another with a minimum loss of time.

In the furnaces which we build, ranging from one up to six tons, nothing is spared to make them efficient. Our ten years of designing and operating is built into them and you get a furnace complete in every detail, ready to take current and turn out steel.

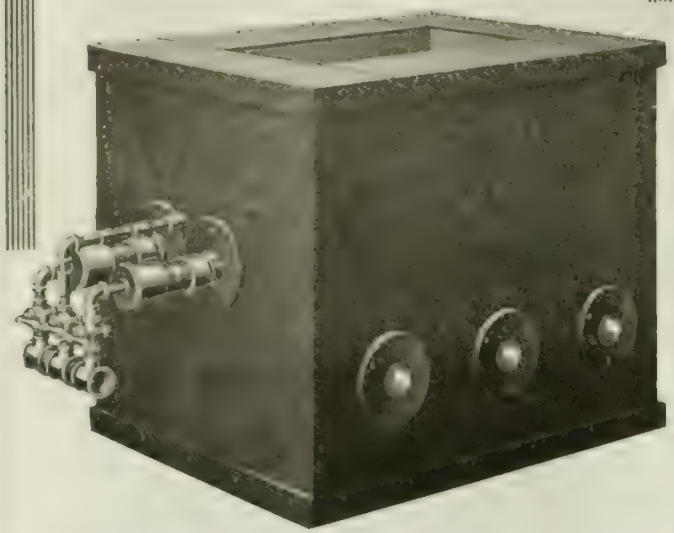
Interested parties would do well to put their electric furnace propositions up to us.

VOLTA MANUFACTURING CO.

WELLAND, ONTARIO

If this advertisement interests you, tear it out now and place with letters to be answered.

Oil Tempering



BELLEVUE FURNACES

are built in standard sizes, equipped with atmospheric gas burners, or in any special size to your order.

The one shown above is so designed that, to draw and temper steel parts, the oil bath is heated accurately and evenly up to 600 degrees Fahrenheit.

Bellevue Furnaces, in 79 different styles and 41 extra sizes, are illustrated and fully described in our catalogue. Write for a copy.

Representative in Canada:
H. W. Petrie, Limited, Toronto, Canada.

Bellevue Industrial Furnace Company

DETROIT MICH.

Every Emery Wheel With Its Own Dresser

Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.

For all ordinary shop grinding wheels specify **"Diamo-Carbo"** —the perfect diamond substitute.

For large, coarse, hard wheels ask for the **"Desmond-Huntingdon."**

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for copy.

The Canadian Desmond-Stephan Mfg. Company

HAMILTON, ONTARIO

Alfred Herbert, Limited, Coventry, Agent for Great Britain

DIAMOND TOOLS

FOR TRUEING GRINDING WHEELS

QUALITY SERVICE SATISFACTION

INDUSTRIAL GEMS

THE GENERAL SUPPLY COMPANY of CANADA, LIMITED

OTTAWA 356 Spark St. | TORONTO 38 Toronto St. | MONTREAL 408 McGill Bldg. | WINNIPEG 85 Water St.

VANCOUVER 906 Vancouver Block

Sole Canadian Agents for

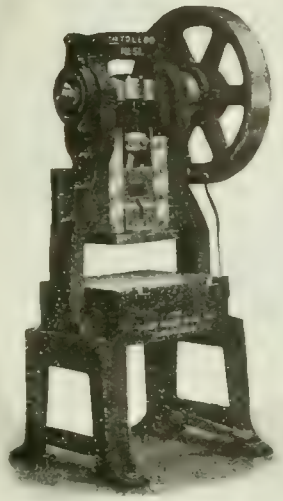
THE JOYCE-KOEBEL COMPANY, INC.

Formerly Geo. A. Joyce Co. Ltd.

NEW YORK LONDON

THE "TOLEDO"

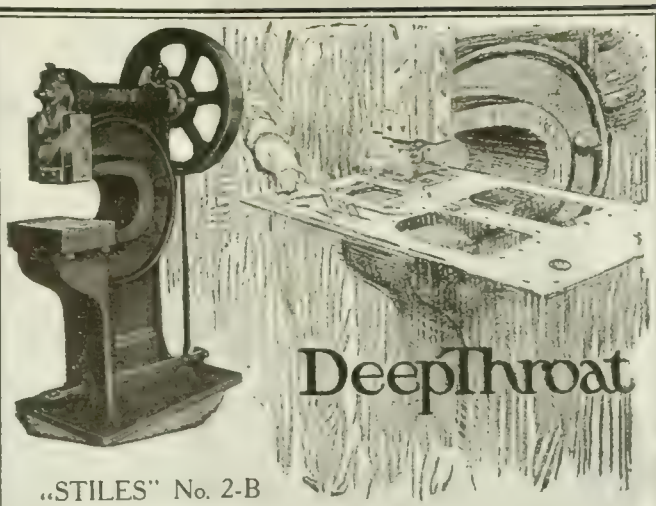
Arch for General Utility Presses



Speeds up the work in the shop and economizes in floor space. With slight modifications will operate nearly all of the blanking, forming, horning, wiring and combination dies used in the manufacture of pieced tinware, buckets, pans, etc.; also adapted to blanking armature discs, and with front removed will operate bumping horns and fixtures, wiring dies, etc. 12 sizes.

The Toledo Machine and Tool Co.

TOLEDO - OHIO



„STILES" No. 2-B

For reaching into the center of large sheets of metal, this model of the "Stiles" type of Press is provided. The massiveness of the frame and its special design make it rigid, even under the most severe punching strains.

BLISS E. W. BLISS CO. BLISS

Brooklyn, N.Y., U.S.A.

1857 CHICAGO OFFICE Peoples Gas Bldg. DETROIT OFFICE 1918 Dime Bank Bldg.
CLEVELAND OFFICE - Union Bank Bldg.
LONDON, S. E. ENGLAND Pocock St., Blackfriars Rd.
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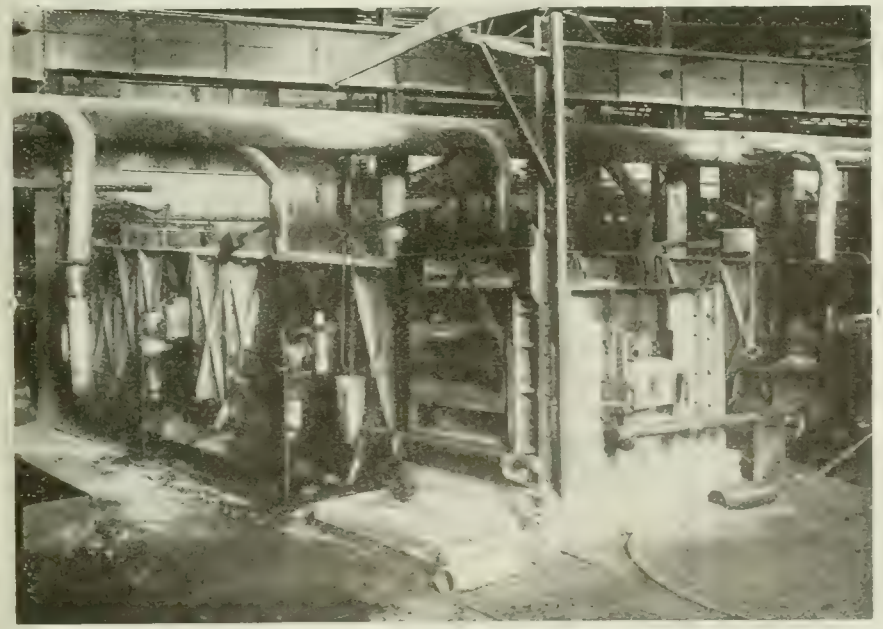
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.

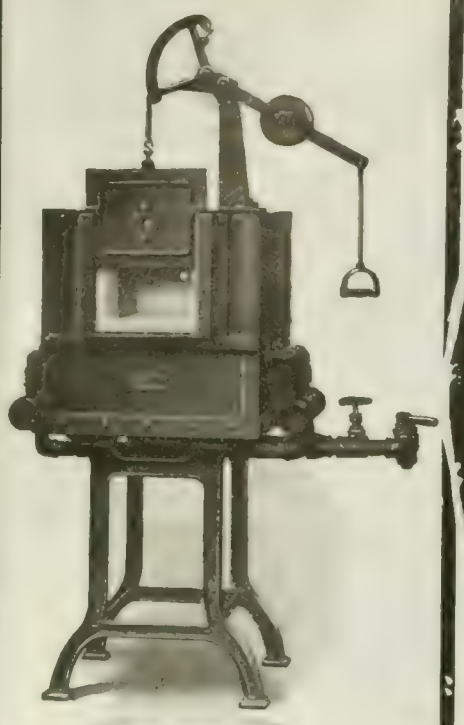


Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering

Company, Limited
Three Rivers, Quebec, Canada



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, make it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than tomorrow--write.

Gilbert & Barker Mfg. Co.

West Springfield, Mass., U.S.A.

Canadian Agents: Williams & Wilson, Montreal, Que. New York Office, 26 Broadway

STANDARD FURNACES

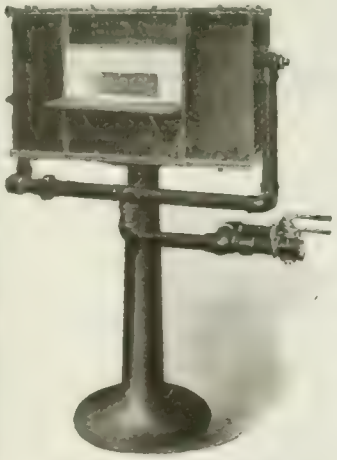
OIL or GAS

Prompt delivery on all tool room types.

For

Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
Riveting

Furnaces built for special requirement



Oil Tempering Furnace

TORONTO OFFICE:

Standard Fuel Engineering Co.

W. H. KIRK, Manager
909 Excelsior Life Building
Phone Main 385

W. D. ANDERSON' ENGINEERING EFFICIENCY SERVICE

If you are not satisfied with the output from your factory let us help you.

We can and will **increase** your **production.**

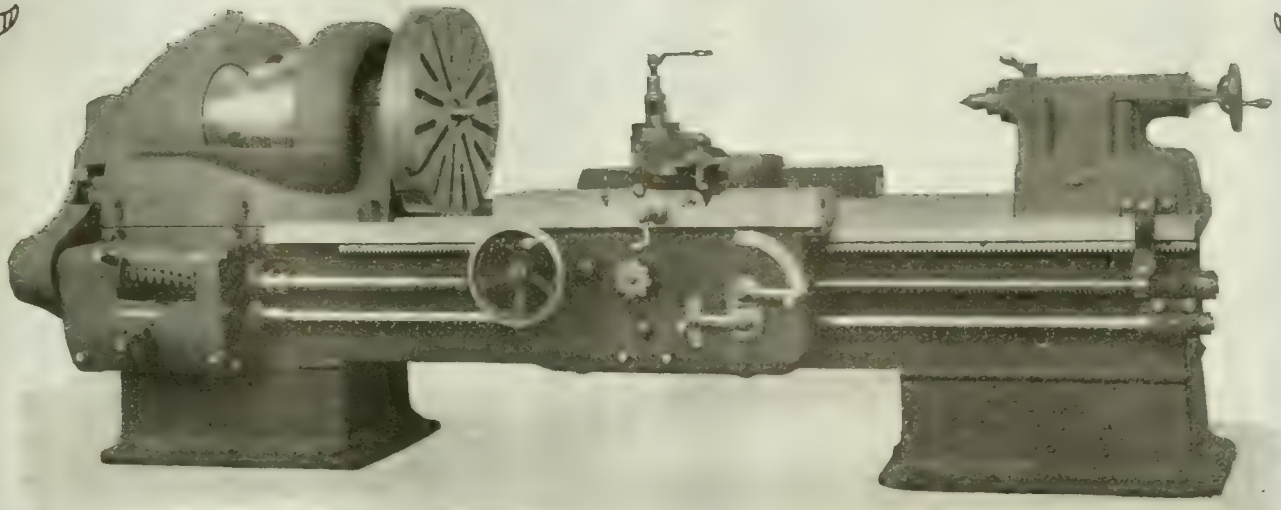
We are **practical men** and **experts** in that field.

Phone Adelaide 221

380 Queen St. West, Toronto, Canada

WICKES BROTHERS

SAGINAW, MICHIGAN, U. S. A.



Double Back Geared Three-Step Cone. Double Plate Apron. Liberal size of parts, and high grade workmanship make the Wickes Lathe equal to the most severe service.

The Wickes has Special Ball Thrust Bearings; Steel Apron Gears Coarse Pitch and Wide Face Gears, which are all well guarded. Let us tell you ALL about our lathes. Built for real service from 15" to 48" swing.

The Wickes 26" Heavy Duty Quick Change Gear Lathe

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.

Marshalltown, Iowa
U. S. A.

"CANADIAN"

ACCURATE work demands accurate and efficient tools.

The Canadian No. 5 has some features worth considering.

Eight speeds, three power feeds—also hand and lever feeds.

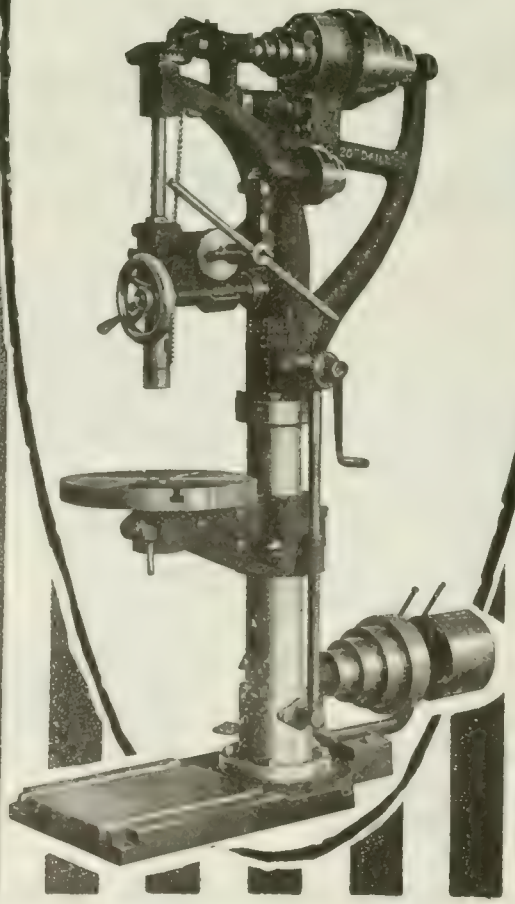
The twist of a knurled knob changes instantly plain drive to back geared drive—no tools to get lost or bother with.

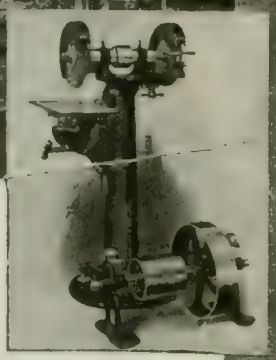
An adjustable automatic trip throws out power feed when piece has been drilled to required depth.

Split adjustable bearings, ball bearing graduated spindle—but then there are so many features—for complete description write for literature.

Circular 1199-16 describes the whole Canadian Upright Series

Canadian Blower & Forge Co., Limited
Kitchener, Ontario



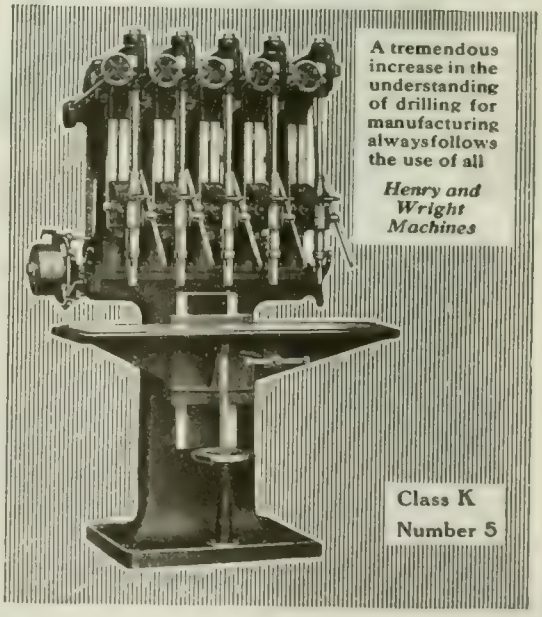


WE BUILD THEM BY HUNDREDS

Standardized Production enables us to offer this powerful **Waterbury Grinder** at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable, practical grinding outfit.

The Blake & Johnson Co., Waterbury, Conn.

HENRY & WRIGHT
Drilling Machines



A tremendous increase in the understanding of drilling for manufacturing always follows the use of all

Henry and Wright Machines

Class K
Number 5

The Henry & Wright Mfg. Co.
Hartford, Conn.

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg. A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal. Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal. General Supply Co., Montreal

Simmons Uni-Pole Magnetic Chuck with T-slot face-plate for heavy grinding and for use on Milling Machine or Shaper

TRADE T-P MARK

Rectangular Magnetic Chuck

for

Immediate Delivery

We offer the following sizes:

10″ x 8″—Plain or T-slot.
18″ x 8″—Plain or T-slot.
31″ x 10″—T-slot only.

Special Sizes to Order

Write for Descriptive Catalogue 105 E

Important Features

Simple Construction.
Insulated Correctly.
Multiple Poles, Unit Coils.
More Holding Power by 40%
Over Heating Impossible.
No Leakage of Magnetism.
Surface for Holding Completely Magnetized.

FACTS

Simmons Magnetic Chucks embody an entirely new feature in Magnetic Chuck construction, namely—absolutely "insulated" magnetic energizing means and "No Leakage" of magnetism into the machine or cutting tools. This same chuck is adaptable to either 110 or 220 volts by a simple change in connections.

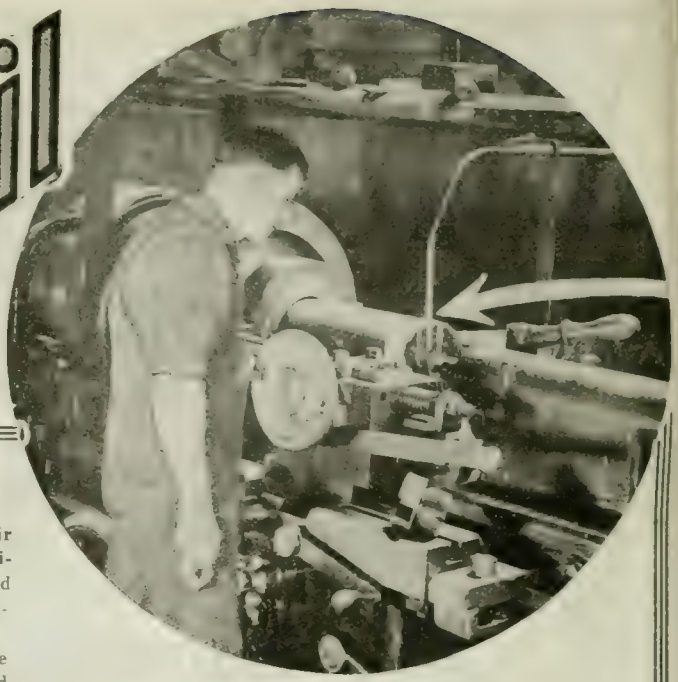
Simmons Uni-Pole Magnetic Chuck with plain face-plate for grinding

TAFT-PEIRCE

Woonsocket, R.I., U.S.A.

NEW YORK: WOOLWORTH BLDG. WILLIAMS & WILSON, LTD., MONTREAL AND QUEBEC. DETROIT: MAJESTIC BLDG.

Elm Cutting Oil



To keep tools at their maximum cutting efficiency it is necessary to flood them constantly with high-grade cutting oils.

Elm Cutting Oil will not only enable you to speed up your production and get clean-cut threads, but eliminates repeats and greatly lessens the breakages of dies. **Once known, always used.**

ELM MOTOR OIL

Another quality line. Absolutely carbonless and reduces friction. Maintains its body regardless of temperatures. Made in three grades: light, medium and heavy. Get acquainted with something really good. Try it.

Cutting, Drawing, Motor and Floor Oils
Linseed Oil Soaps and Cup Greases

Elm Cutting Oil Co.
645 East King St., TORONTO

Production of Rare Quality at Lowest Labor Costs

There is unusual strength, accuracy, speed, convenience and range in

AURORA
Drilling Machines

You can use them to great advantage on **HIGH EXPLOSIVE SHELLS** or any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works
AURORA, INDIANA, U.S.A.

The BARNES DRILLS

TRADE WF JO MARK

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

SEND FOR CATALOG.

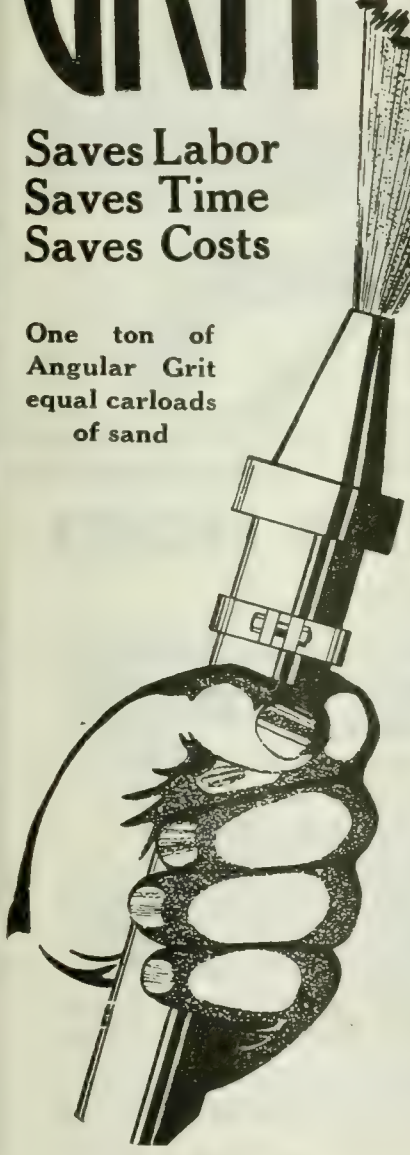
W. F. & JOHN BARNES CO.
104 Ruby Street - ROCKFORD, ILL.
Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.
WILLIAMS & WILSON, Montreal

ANGULAR GRIT

Saves Labor
Saves Time
Saves Costs

Quicker and Better

One ton of Angular Grit equal carloads of sand



ANGULAR GRIT offers you the most advanced and economical method of cleaning castings, etc. Its angular and irregular cutting points clean raw castings and forgings more thoroughly and with greater speed than either sand or shot.

ANGULAR GRIT dispenses with sand bins and sand dryers, and there is no dust nuisance where it is used.

If you are using sand, think of the labor you can save by adopting ANGULAR GRIT in its place.

Used for all kinds of cleaning operations —best materials for cleaning shells. Prove its superiority by giving it a trial.

Pittsburgh Crushed Steel Co.
Established 1888
Pittsburgh, Pa., U.S.A.

Canadian Representatives:
Williams and Wilson Ltd., Montreal, P.Q.

VENUS PENCILS

THE old reliable stand-bys are now being utilized in the industries of peace. The pencil is the first tool used in the change. The long established famous VENUS Pencils (made in 17 degrees) always can be depended on for the most exacting work.

17 black degrees
and 3 Copying

For bold heavy lines
6B-5B-4B-3B

For general writing and sketching
2B-B-HB-F-H

For clean fine lines
2H-3H-4H-5H-6H

For delicate thin lines, maps
7H-8H-9H

Special 14c. Offer

Send 14 cents for 3 trial samples, mentioning degrees. After you find how perfect VENUS Pencils are, buy them at any dealer.

Of all stationers and stores throughout the world.

American Lead Pencil Company
238 Fifth Avenue, New York
and Clapton, London, Eng.

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SPUR-GEAR
CHAIN BLOCKS

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MORRIS CHAIN-BLOCKS ARE USED IN GREAT NUMBERS IN THE INDUSTRIAL PLANTS OF CANADA AND HAVE GAINED A MOST VALUABLE REPUTATION.

THERE IS A SIZE TO MEET YOUR PARTICULAR NEEDS. MAY WE TELL YOU MORE ABOUT THEM?

The Herbert Morris Crane & Hoist Company, Limited

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Philadelphia GEAR Works
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Spur, Bevel, Herringbone, Spiral and Intermittent

Gears and Pinions

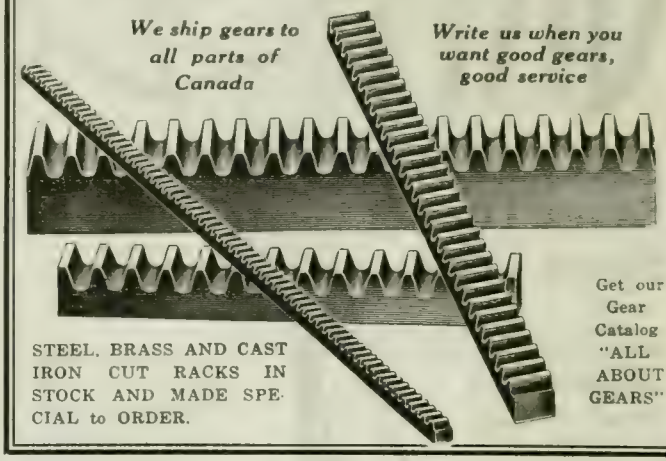
Made in all kinds of metals, rawhide and fibre

SPROCKET WHEELS made to order.

DIAMOND CHAINS for Power Transmission, Machinery, Motor Trucks, Motorcycles and Bicycles.

We ship gears to all parts of Canada

Write us when you want good gears, good service



STEEL, BRASS AND CAST IRON CUT RACKS IN STOCK AND MADE SPECIAL to ORDER.

Get our Gear Catalog "ALL ABOUT GEARS"

USED STEAM ENGINES
FOR SALE

One Left-Hand Improved Horizontal Simple Automatic Laurie Corliss Engine.

Diameter of Cylinder	**28″**
Length of Stroke of Piston	**48″**
No. of Revolutions per minute	**75**
Fly Wheel	**18′ x 12½″ Face**
Weight	**40,000 lbs.**
Rated Horse Power	**625**
I. H. P.	**700**
Max.	**950**

One 25″ x 50″ Left-Hand Wheelock Engine.
One 20½″ x 46″ Left-Hand Wheelock Engine.

These engines are in excellent condition.

Photograph and full particulars will be sent on application to

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Toronto, Canada

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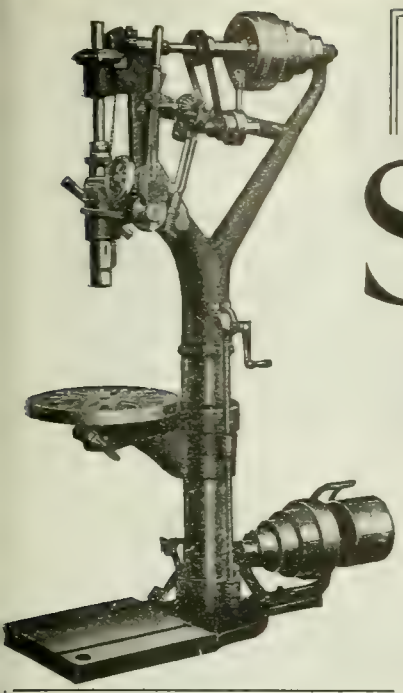
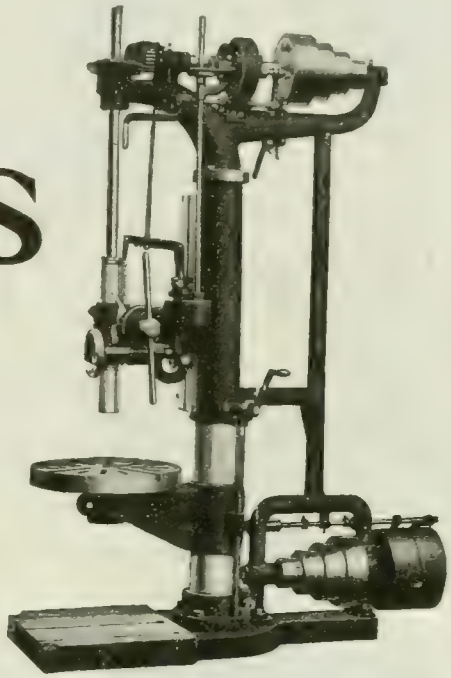


Meet the keen competition of peace times by putting into your shop faster, stronger and more accurate upright drilling machines. Sixty-four years' drill building experience is back of these perfected

Silver Drills



The 25" Silver Drill has eight spindle speeds and six positive geared feeds. The 20" Silver Drill is built in four distinct styles with round or square base. Furnished singly or in gangs of 2, 3 or 4 spindles.

Write for further facts.

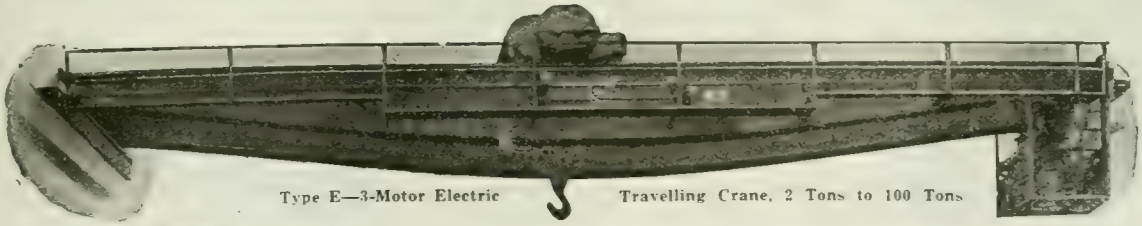
The Silver Mfg. Co.

290 Broadway

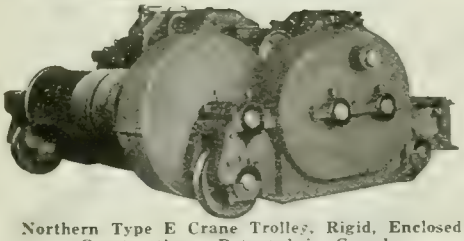
SALEM OHIO

CANADIAN MADE CANADIAN MADE

Electric and Hand Traveling Cranes

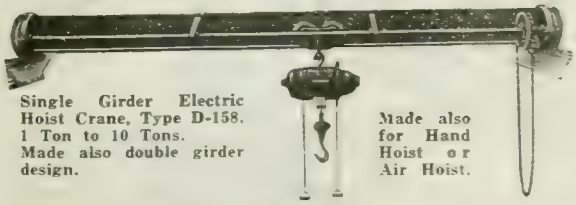


Type E—3-Motor Electric Travelling Crane, 2 Tons to 100 Tons



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



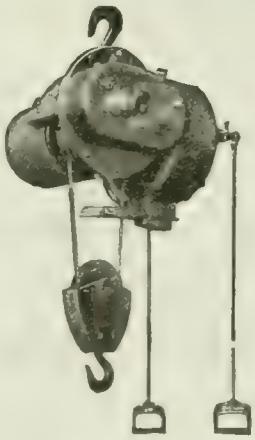
Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.



Type D Electric Hoists —½ to 10 Tons.

Air Hoists, Trolleys and Tracks.

Type No. 20 Air Hoist.

Northern Crane Works, Limited

Walkerville, Ontario, Canada

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"Wanted—A National Plan"

An article of unusual importance, by Sir George Bury, formerly vice-president of the C.P.R., appears in the February issue of MACLEAN'S. He points out that Canada must more definitely shape her destiny if that destiny is to be as glorious as all Canadians hope. It is a stirring demand for Canadians to get together in the formation of a national plan, accompanied by many practical suggestions from his experience in transcontinental railroad building. An article of national importance.

"Germany From Within To-day"

The funniest thing that he has perhaps written appears in February MACLEAN'S from the pen of Canada's great humorist, Stephen Leacock—an imaginary visit to Berlin under the Bolsheviks. He finds Von Tirpitz planning a new navy, an *inland fleet;* Frau Krupp, an apple woman; Von Bethmann-Hollweg, a cab driver; Bernstorff, a Bolshevik and president of the Scavengers Union. He finds a *Get From Under* committee planning a trade war on the world and half the population of Berlin in English clothing or Scotch kilts. He finds—

But read the article. There's a long laugh in every line. It is farce, however, built up on pretty shrewd truths.

You will find this a remarkably interesting number. The bold, fighting face of Admiral Beatty is on the cover and inside are the following big features:

The Campaign Against Britain, by Agnes C. Laut.
The Farmer in Politics, by J. K. Munro.
The Strange Adventure of the Thumb Tap Clue, by Arthur Stringer.
Old Times in Canada, by Walt Mason.
Lend Me Your Title, by Onoto Watanna.
The Three Sapphires, by W. A. Fraser.
Wild Miners I Have Met, by E. Ward Smith.
The Anglicization of Katrina, by Mary Josephine Benson.
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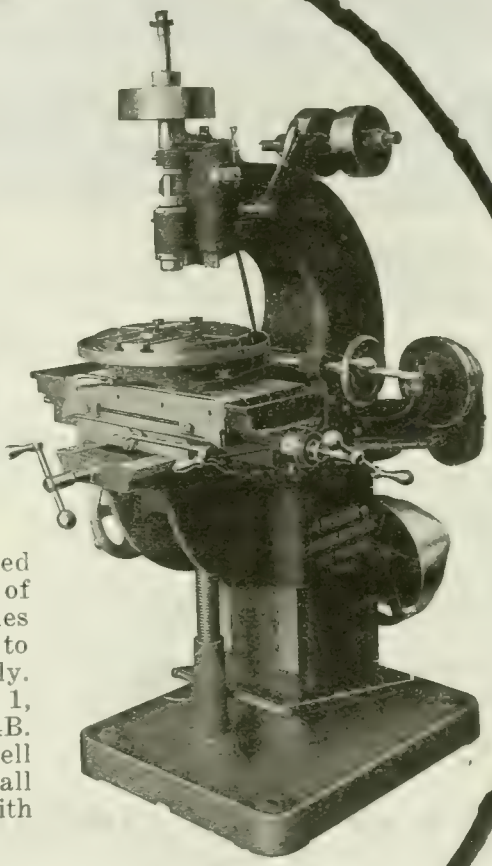
BECKER

for

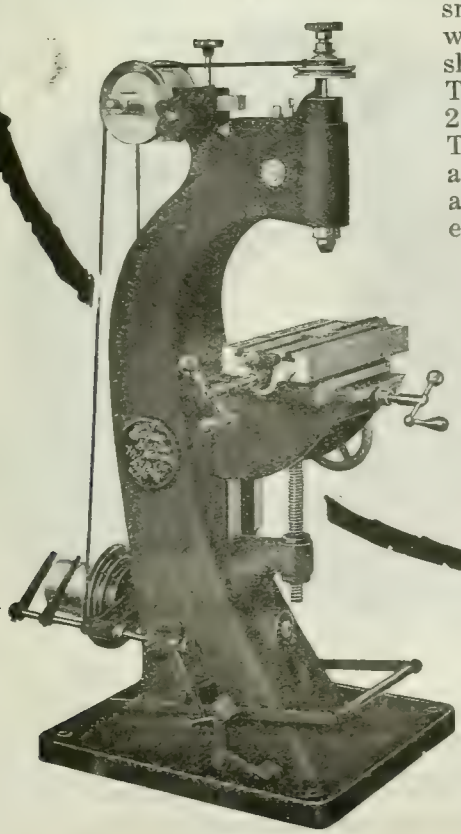
Quick Deliveries on

Milling Machines



"BECKER BELT DRIVEN MILLERS" —The machines that give the smooth finish.

The "Beckers" illustrated here represent our line of small milling machines which we are prepared to ship to you immediately. The line includes: No. 1, 2, 2A, 2H, 3 and 4B. These machines are well adapted to Milling small and medium parts with exceptional rapidity.



It is not only from a point of rapid delivery that Becker Milling Machines should appeal to you. They are built on the most advanced and original lines. All of which combines to obtain the greatest capacity and range with least weight and horse power. The "Becker" is a Miller you should know more about—let us get in touch with you without delay.

Write for Catalog

Becker Milling Machine Co.
Hyde Park, Boston, Mass.

Canadian Agents:
Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal
A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto

TRANSVEYORS

—Reduce labor.

—Eliminate rehandling.

—Speed up production.

Place material on Cowan platforms—and you are through handling. To transfer the load slip the Transveyor under the platform, pull the handle forward—the load becomes mobile.

Data concerning Transveyor economy is yours for

the asking.

To what address shall we send it?

COWAN TRUCK COMPANY
15 Water St.
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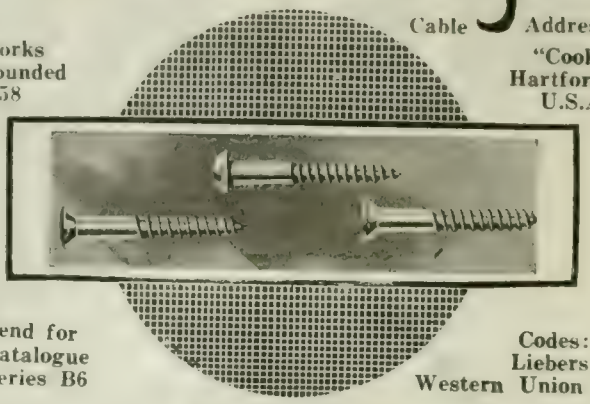
Also Manufacturers of a complete line of electrically driven factory transfer trucks.

Canadian Agent: R. B. Smiley, Walker House, Toronto, Canada.

Wood Screw Making Machinery

Works Founded 1858

Cable Address "Cook" Hartford, U.S.A.



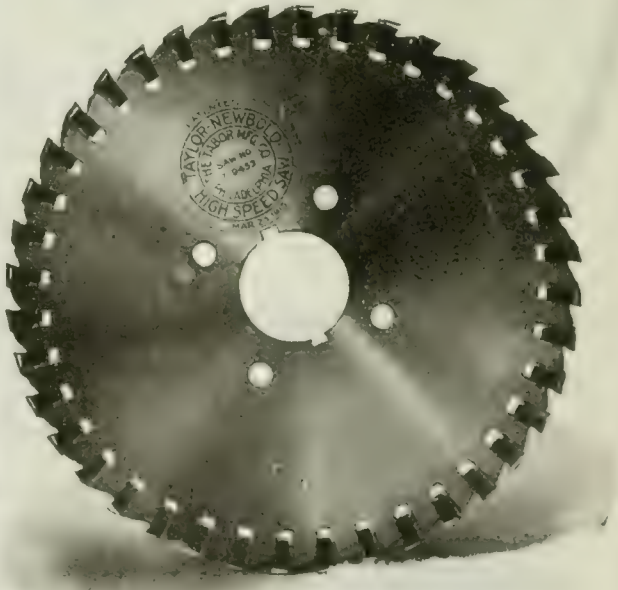
Send for Catalogue Series B6

Codes: Liebers Western Union

Complete plant equipment for making screws of types shown above. All machinery automatic. The almost universal use of our machinery proves its worth.

Asa S. Cook Co.
Hartford, Conn.

THE IMPROVED
TAYLOR-NEWBOLD



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Tabor Mfg. Co., Philadelphia, U.S.A.

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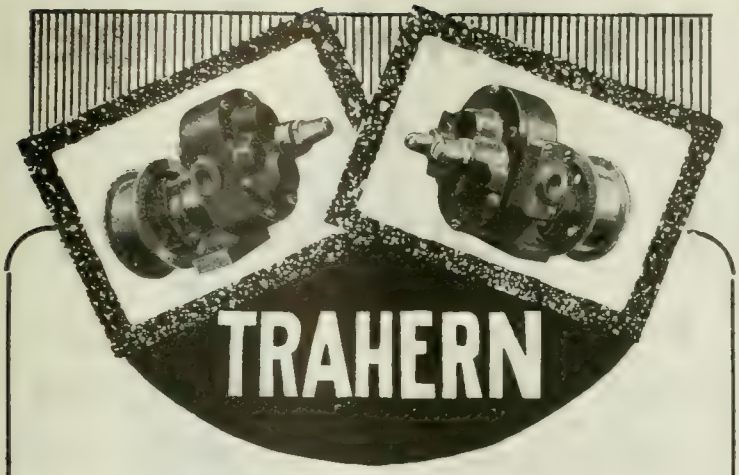


ROTARY GEARED PUMPS

The Utmost in Efficiency and Durability

Trahern Positive-drive Rotary-geared Pumps shoot the lubricant into deep bores or other work difficult to cool. Never need to lessen the speed of the cutting tools for the reason that Trahern Pumps, even at slow speed, flood the cutting tool with abundant coolant.

Let us send a sample pump free of charge—to prove that Trahern Geared Pumps are preferable.

Trahern Pump Company

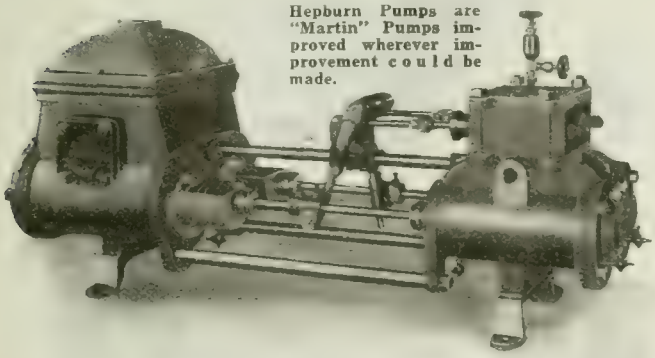
ROCKFORD, ILLINOIS

Canadian Agents :

A. R Williams Machinery Co., Toronto

Hepburn Pumping Machinery

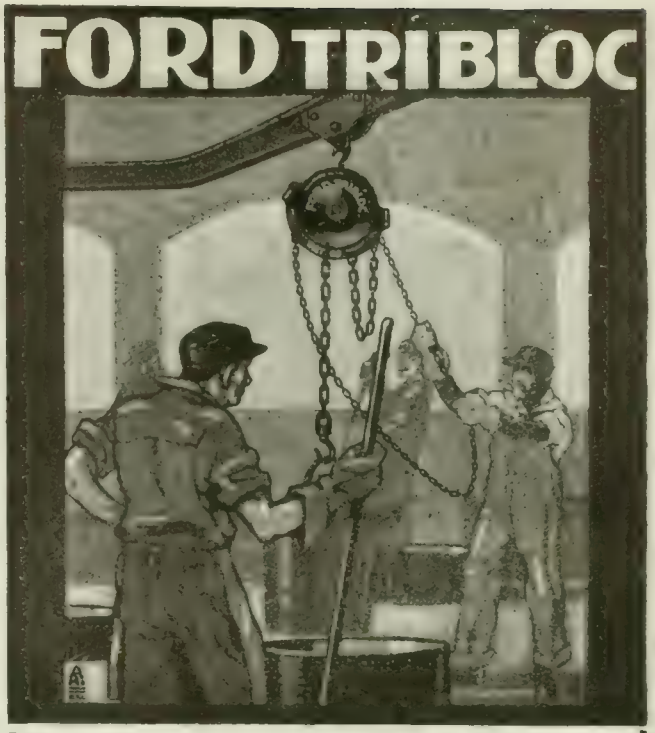
Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street Toronto, Ontario



Performance and Durability

are inseparable in a Ford Tribloc Chain Hoist.

PERFORMANCE---speed and high efficiency obtained through the use of planetary gearing and the patented LOOP HAND CHAIN GUIDE which prevents "gagging" and damage to the hoist.

DURABILITY--long life assured by the use of steel working parts, independent dust-proof steel gear case and an actual 5-year guarantee.

Catalog 3 tells the story.

Ford Chain Block & Mfg. Co.

Second and Diamond Sts.

PHILDELPHIA, PA.

OVER SEAS REPRESENTATIVE

ALMACOA ALLIED MACHINERY COMPANY OF AMERICA 120 BROADWAY NEW YORK U.S.A. ALMACOA

2146-D

THE "VULCAN" SAFETY WAY

YOUR PROFIT

increases with the facility with which your mechanic does his work.

Danger-inviting obstructions upon tools block your manufacturing progress.

A "VULCAN" Safety Lathe Dog will always protect against the dangers of the old style projecting screw.

A "VULCAN" Safety Lathe Dog will remove the "danger-sense" from your employee's mind—the "capacity-robber" from your payroll.

"VULCAN" Safety Lathe Dogs will not impose One Cent's Worth of burden upon your shop equipment—improvements have not increased the prices.

"VULCAN" Safety Lathe Dogs bid you "Keep Step" if you would decrease your liability insurance.

Machinists' Tools Booklet on request.

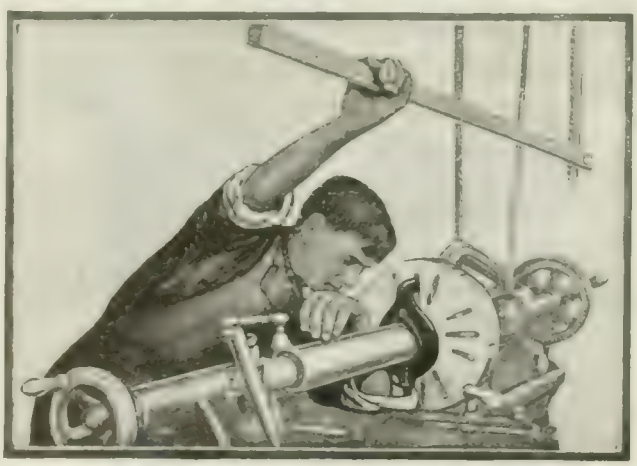
J. H. WILLIAMS & CO.

"The Drop-Forging People"

45 Richards Street, Brooklyn N.Y.

Western Office and Warehouse: 45 S. Clinton St., Chicago, Ill.

The A. G. Low Co., Ltd., 45 Pacific Ave., Saskatoon, Sask., Agents for Manitoba, Saskatchewan, Alberta and British Columbia.



THE OLD ARM-BREAKING WAY

It's Their Time

But

It's Your Money

A man with a sharp file will work faster than a man with a dull file; and he'll be more contented and less tired at the end of the day.

The cost of a new file as a rule is less than one hour's wasted time. You gain, therefore, by telling men to turn in files when they have passed their efficient point. You also gain by ordering Famous Five Files. They give long and efficient service.

Specify them when ordering.

They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

A Time Saver—
Can You Beat It?

HAVE you noticed the Consolidated Clamp Connection on all Consolidated Presses? Grips like a vise and stays put, one of the bull-dog kind, which, when properly tightened, will not break away, or slip.

If you break it we will furnish a new one free of charge.

Consolidated Press Company

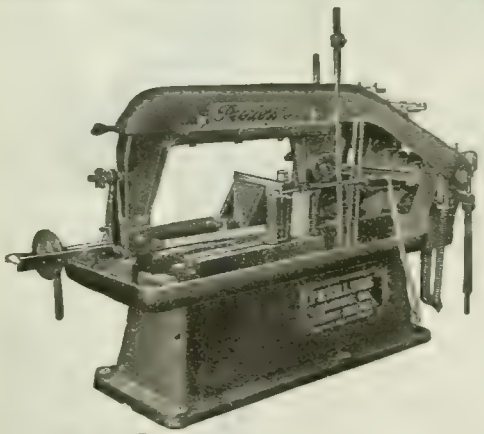
HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

Peerless HIGH SPEED

THE NEW STANDARD

Increases Production 50 to 100%



Why Not?

WHEN big plants of national reputation, who are using three, six, eight, twelve and up to thirty or more Peerless Machines say that they increase production from 50 to 100 per cent., saving in time, labor, blades and expensive material;

AND WHEN we are willing to have you try out the Peerless for 30 days' at our own risk and expense, we paying freight both ways if it fails to make good;

THEN WHY NOT try it out for yourselves, when the gain is more yours than ours if it makes good, and if it fails the loss is ours alone?

PEERLESS MACHINE CO.

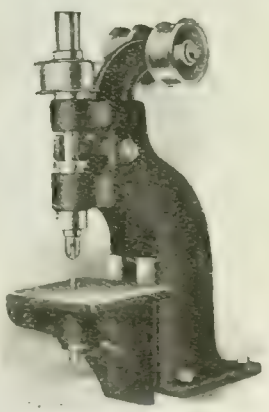
1607 RACINE STREET RACINE, WISCONSIN

The GRANT

Spins a Polished Rivet Head Every Second Without Noise

A dozen of these GRANT ROTARY RIVET SPINNING MACHINES going at full speed would not awake a light sleeper in the same room.

The GRANT is fast. In one second it will quietly spin a polished rivet head without breaking or in any way marring the casting. It will rivet tight or loose, as required. The GRANT boosts the output, cuts the cost, and turns out perfectly accurate work.



Grant Noiseless Rotary Rivet Spinning Machine.

Pleased to tell you more about it. Write..

The Grant Mfg. & Machine Co.

Holland Ave., Bridgeport, Conn.

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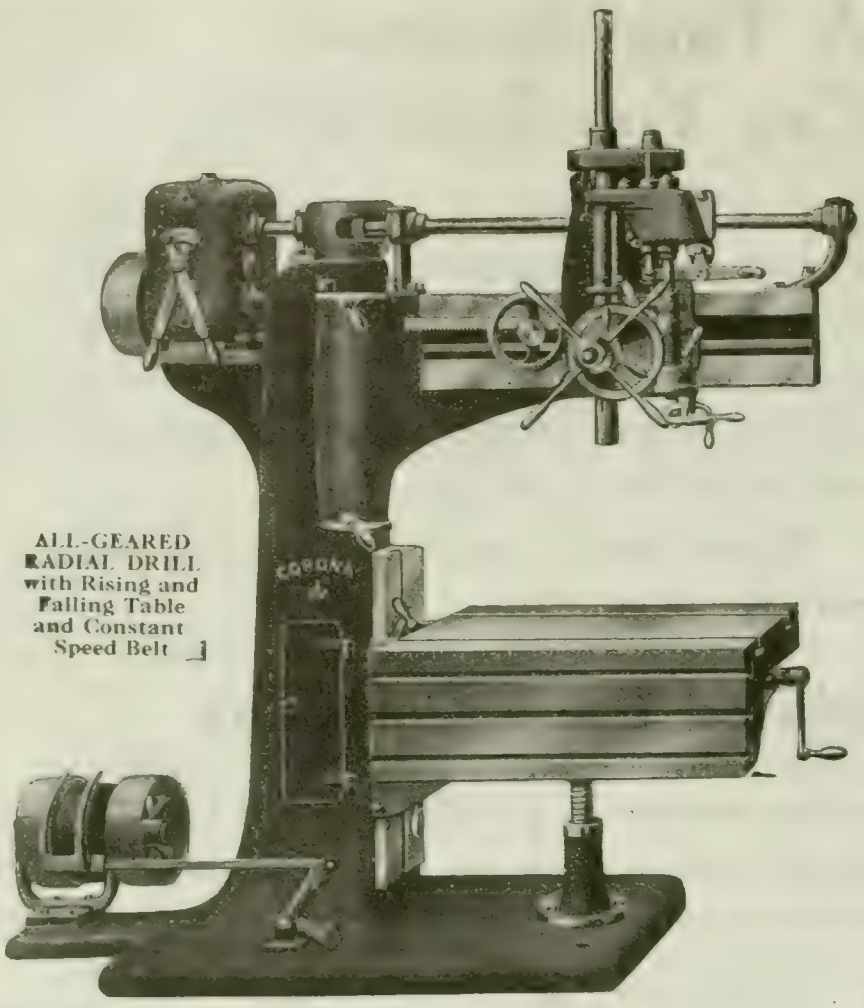
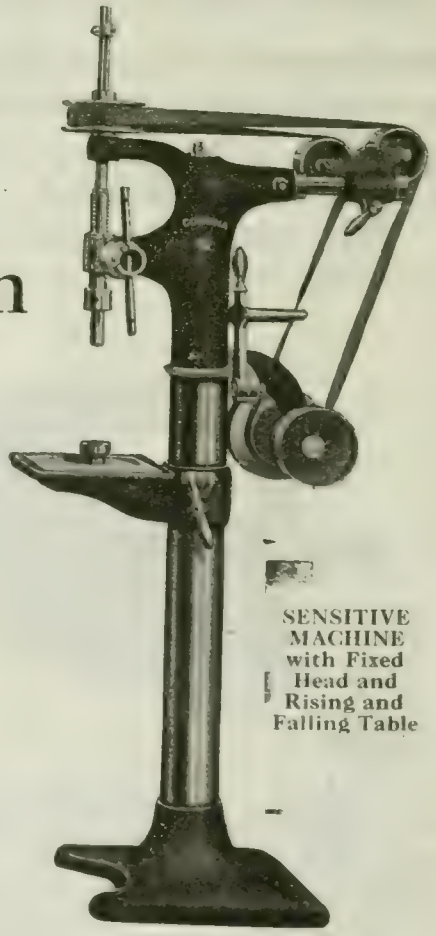


ALL-GEARED RADIAL DRILL with Rising and Falling Table and Constant Speed Belt

THIS Radial Drill is an excellent example of "Corona" quality and fine workmanship. It is built for drilling holes of different sizes up to 1½ inches diameter. It promotes rapid and accurate operations as its rising and falling table enables the material to be brought up to the drill so that the operator can work at a convenient height.

MANY important improvements over other drills will be found in the "Corona" Sensitive Models, of which the picture underneath is a typical example. Some of their leading features are—graduated steel rack bushes, adjustable feed handles, and two driving keys to all spindles.



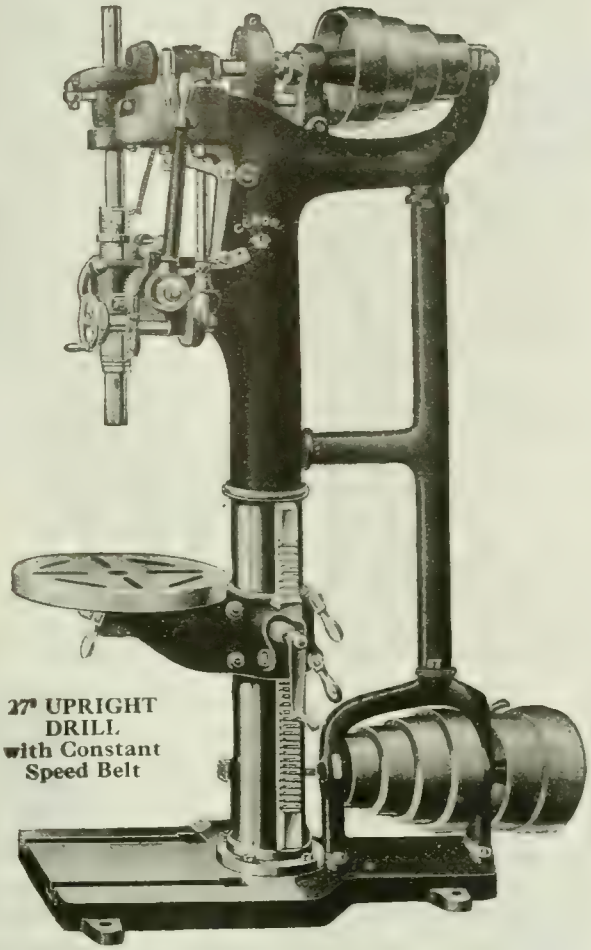
SENSITIVE MACHINE with Fixed Head and Rising and Falling Table

The Corona Campaign

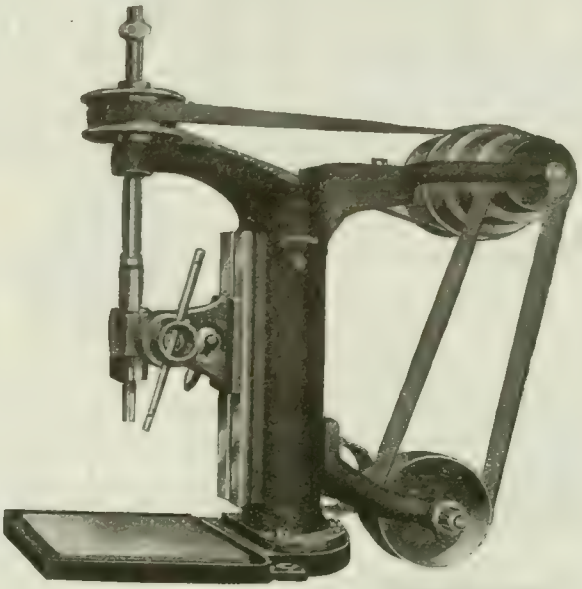
THE object of Corona publicity is to ever broaden those fields in which the name "Corona" is already well established and is recognized to mean the best that is procurable in drilling machines. Our aim since the earliest days of our activities, has been to design and construct such drilling machines as will perform their respective operations in the most efficient, time-saving and economical manner. We have specialized and we've experienced that success which such a policy ensures. When you buy a Corona you not only obtain a drilling machine of unusually skilful workmanship and ingenious design, but one into which has gone the experience we've accumulated in over twenty years' unwavering effort to surpass all other manufactures in this line. To-day we cordially invite your correspondence.

Fredk. Pollard & Co., Ltd.

Corona Works - Leicester, Eng.



27" UPRIGHT DRILL with Constant Speed Belt



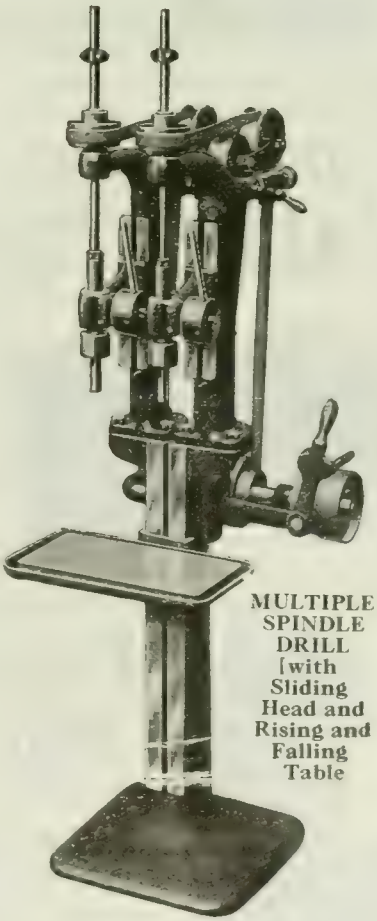
BENCH DRILL with Sliding Head, Cone Pulley Drive, giving Three Speeds

Typical Corona Machines

"Corona" Upright Drills have renewable cast iron self-oiling bearings, spindles have two driving keys and an additional slot for cottering up facing bars, etc., graduated rack bushes made from bar lined with gun metal and teeth cut from solid; back gear pinions, bevel pinions and feed driving pinions are made from steel and are accurately machine cut.

The Bench Drill we illustrate is entirely self-contained; it has two driving keys, large diameter pulleys, graduated steel rack bush, adjustable feed handle and will efficiently and speedily drill holes of ⅝-inch diameter. This model will be found exceptionally convenient for arranging in gangs and will make for economy in shop room.

"Corona" Multiple Spindle Drills have been specially designed for small work when the maximum hole to be drilled is ½-inch diameter. They are ideal for such work as that for which they are intended. The fine workmanship put into their construction is a guarantee of their durability.



MULTIPLE SPINDLE DRILL with Sliding Head and Rising and Falling Table

Fredk. Pollard & Co., Ltd.

Corona Works - Leicester, Eng.

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(Industrial)

MOUNTED or UNMOUNTED Fine Quality

NORTON

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of Canada, Limited

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Montreal, Que.

PRESSES and SHEARS

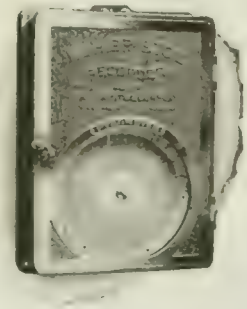
Sheet Metal Working Machinery

THE D. H. STOLL CO., INC.

BUFFALO, N.Y.

BRISTOL'S ELECTRIC PYROMETERS

FOR EVERY SERVICE



Bristol's Recording Pyrometer furnished with patented frictionless smoked chart recording system, especially valuable for processes requiring continuous heat treatment.

Simplicity of construction and ruggedness make them ideal shop pyrometers. The ONLY pyrometer equipped with Weston milli-voltmeter movement.

Write for Bulletin I-205.

THE BRISTOL CO.

WATERBURY, CONN., U.S.A.

SKINNER

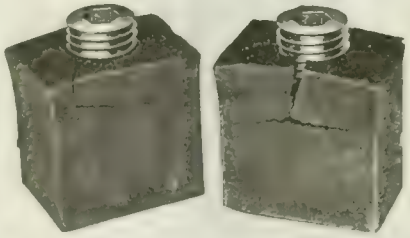
New Model Standard DRILL CHUCKS Geared Pattern Positive Drive

In Stock for Immediate Delivery.

The Skinner Chuck Co.

NEW BRITAIN CONN., U.S.A.

The Greater Strength of ALLEN Hexagon Socket Set Screws



A broken set screw means time wasted, trouble and expense. When you force the Allen something has to go. This time it was the block.

THE ALLEN MFG. COMPANY

Hartford, Conn, U.S.A.

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS

Won The

GRAND PRIZE

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

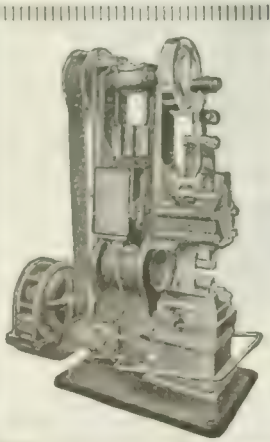
THEY ALWAYS MAKE GOOD

Write for Catalog.

Armstrong Bros. Tool Co.

"The Tool Holder People"

306 N. Francisco Ave.. CHICAGO. U.S.A



Fairbanks Hammers

25 to 300 lbs.

Belt or Motor Drive

These Hammers Embody a Design and Workmanship that are Unsurpassed.

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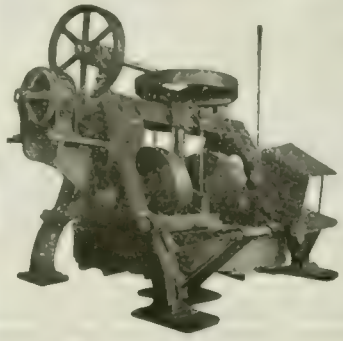

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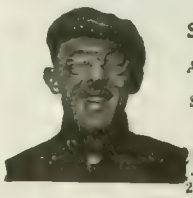

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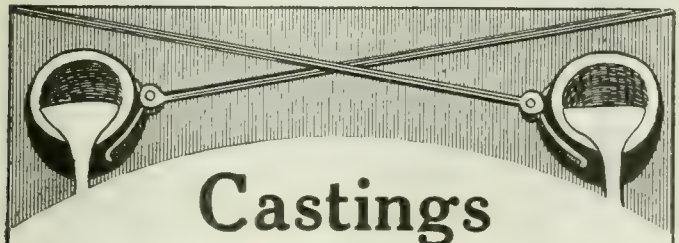

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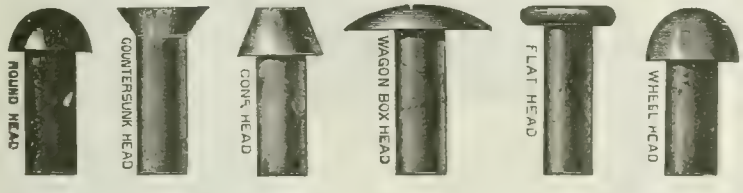

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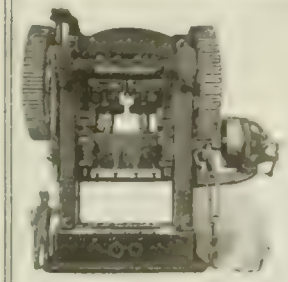

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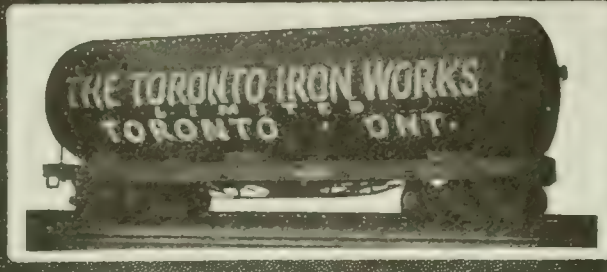

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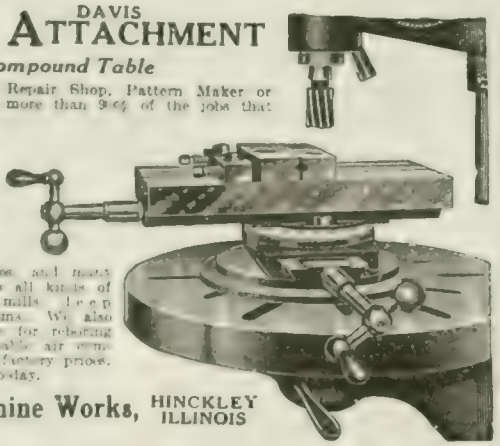

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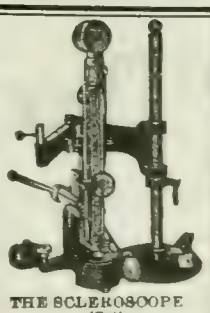

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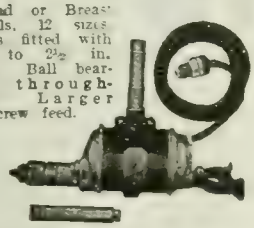

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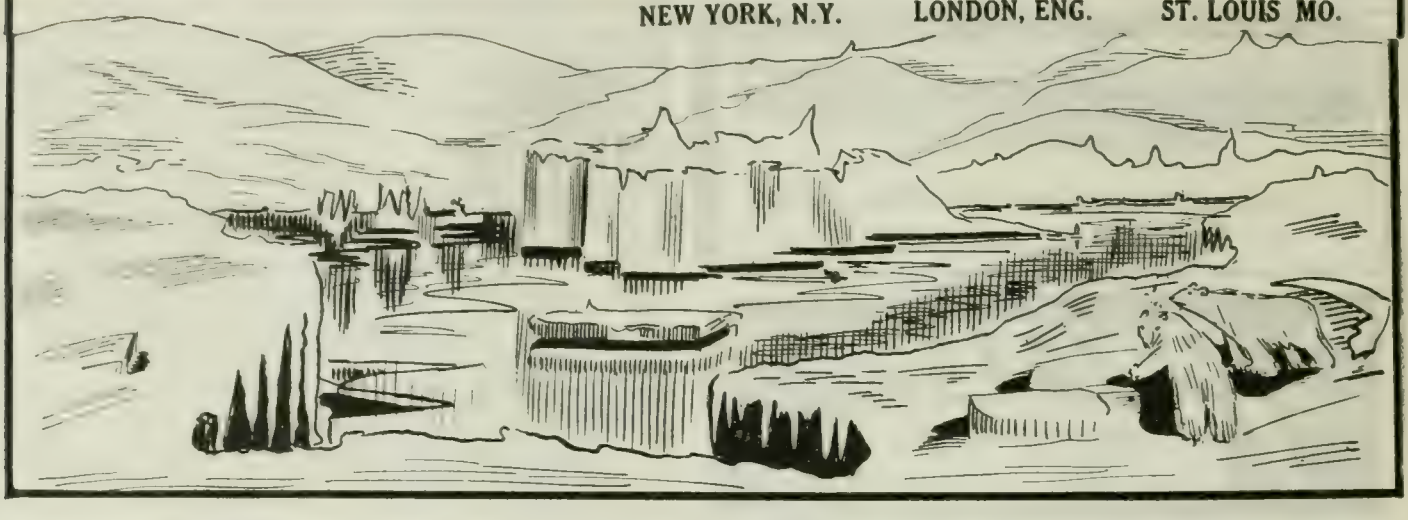

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Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Giddings & Lewis Mfg. Co., Fond du Lac, Wis
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis
Foss Mchy. & Supply Co., The Geo. F., Montreal
Niles-Bement-Pond Co., New York.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland, Ohio
New Britain Mach. Co., New Britain, Conn

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland, Ont

BRASS AND COPPER BARS, RODS AND SHEETS
Brown's Copper & Brass Rolling Mills, New Toronto.
Tallman Brass & Metal Co., Hamilton, Ont.

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilson & Co., J. C., Belleville, Ont.

BRIQUET-INGOTS
Eastern Block Corporation, Chicago, Ill

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co. Inc., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que

BRIDGES, RAILWAY AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Holland Mfg. Co., Montreal, Que.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.

BRONZE, COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd. ,Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock Walker Machinery Co., Toronto, Ont.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville, Ont

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananoque, Ont.

BUSHINGS, BRONZE
Oberdorfer Brass Co., M. L., Syracuse, N.Y

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CALKS, BOOT
Lufkin Rule Co. of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Ferracute Mach. Co., Bridgeton, N.J
Brown, Boggs & Co, Hamilton, Can

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont

CARBONIZING BOXES
Swedish Crucible Steel Co., Windsor, Ont.

CARRIERS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Can.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Marsh Engineering Works, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill

CARS, STEEL BODY
Marsh Engineering Works, Belleville, Ont.

CASTINGS, MACHINERY
Tolland Mfg. Co., Montreal, Que.
Winnipeg Iron Foundry Co., Winnipeg
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER
Algoma Steel Corp., Sault Ste. Marie, Ont.
Alexander Fleck, Ltd., Ottawa.
Greenleafs, Ltd., Belleville, Ont.
Oberdorfer Brass Co., M. L., Syracuse, N.Y
St. Lawrence Welding Co., Montreal, Que.
Tallman Brass & Metal Co., Hamilton.
United Brass & Lead Ltd., Toronto.
Wentworth Mfg. Co., Hamilton, Ont.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie, Ont.
Tolland Mfg. Co., Montreal, Que.

CASTINGS, GRAY IRON
Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Can
Alexander Fleck, Ltd., Ottawa.
Gardiner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Que
International Malleable Iron Co., Guelph, Ont.
Kennedy & Sons, Ltd., Wm., Owen Sound.
Marsh Engineering Works, Belleville, Ont.
Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.
Tolland Mfg. Co., Montreal, Que.
Fittings, Ltd., Oshawa, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ROUGH
Tolland Mfg. Co., Montreal, Que.

CASTINGS, NICHROME
Can. Driver-Harris Co., Walkerville, Can

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dominion Foundries & Steel, Ltd., Hamilton, Ont
Hull Iron & Steel Foundries, Ltd., Hull, Que
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
Fittings, Ltd., Oshawa, Ont.
International Malleable Iron Co. Guelph, Ont

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull, Que

CEMENT MACHINERY
Canadian Fairbanks-Morse Co., Ltd., Montreal
Gardner, Robt., & Son Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont

CENTRE REAMERS
Bertram & Sons Co., John, Dundas
Gardner, Robt., & Son, Montreal.
Hurlburt, Rogers Mach. Co., South Sudbury, Mass
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal
Ford Chain Block & Mfg. Co. Philadelphia, Pa
Garlock-Walker Machy. Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Rice Lewis & Son Toronto, Ont
Wright Mfg. Co., Lisbon, Ohio

CHAIN LINKS, DETACHABLE
Fittings, Ltd., Oshawa, Ont.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 316 Stair Bldg., Toronto, Ont

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto

CHESTS, TOOL
Mechanics Tool Chest Co., Toronto

CHROME VANADIUM STEEL
J. F. A. Comstedt, New York City, N.Y
General Steel Co., Milwaukee, Wis

CHROME NICKEL STEEL
J. F. A. Comstedt, New York City, N.Y
General Steel Co., Milwaukee, Wis

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Smalley-General Co., Inc., Bay City, Mich

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., T. R., Ashburnham, Mass
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford
Knight Metal Products, Ltd., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Rice, Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont
Gardner Machine Co., Beloit, Wis.

CHUCKS, WRENCH
Thomas Elevator Co., Chicago, Ill.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
New Britain Machine Co., New Britain, Conn.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto, Ont
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach Co., Brazil, Ind., U.S.A.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., S. F., Inc., Fort Wayne, Ind

CLAMPS
Preston Woodworking Machine Co., Preston, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Jones & Glassco, Montreal, Que.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco., Montreal, Que.
Positive Clutch & Pulley Works, Ltd., Toronto.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Marsh Engineering Works, Ltd., Belleville, Ont.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto, Ont
Sleeper & Hartley, Inc., Worcester, Mass

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

COKE AND COAL HANDLING EQUIPMENT
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can.

COLLARS, SHAFTING
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston, Mass
Manufacturers' Equipment Co., Chicago, Ill
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.
United Brass & Lead Ltd., Toronto

COMBINED OPEN SIDE PLANER-SHAPER
Lund-Farquhar Co., Boston, Mass.

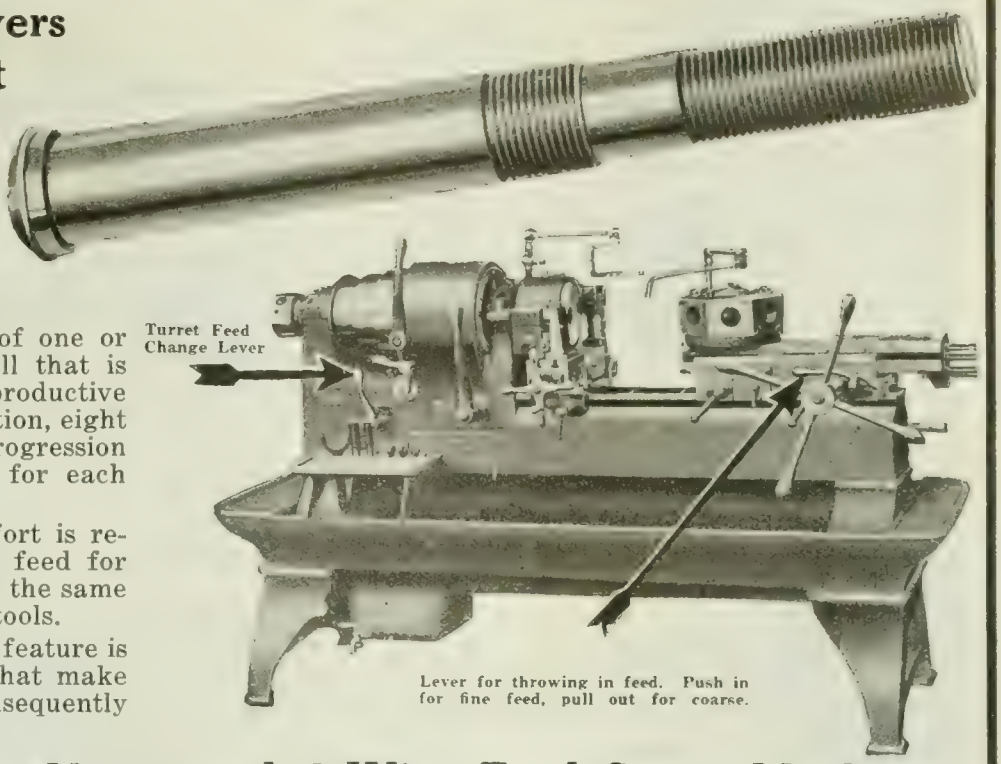
COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Curtis Pneumatic Machy. Co., St. Louis, Mo
Garlock-Walker Machinery Co., Toronto, Ont
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Riverside Machinery Depot, Detroit, Mich
Smart Turner Machine Co., Hamilton, Ont

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich

CONNECTING RODS
Canada Found'n & Forgings, Ltd., Welland, Ont

CONSULTING, CONTRACTING AND GENERAL ENGINEERING & MACHINE WORK
Manitoba Bridge & Iron Wks., Ltd., Wpg., Can

Two Handy Levers Give the Correct Turret Feed For Each Operation on this Piece



The simple movement of one or both of these levers is all that is required to get the most productive feed for each turret operation, eight feeds in geometrical progression being instantly available for each spindle speed.

Practically no more effort is required to use the correct feed for each operation than to use the same feed for the entire seven tools.

This "turret-slide-feed" feature is but one of many points that make for handiness and consequently FAST PRODUCTION on

Brown & Sharpe Nos. 4 and 6 Wire Feed Screw Machines

BROWN & SHARPE MFG. CO.
Providence, R.I., U.S.A.

Canadian Representative:
CANADIAN FAIRBANKS-MORSE CO., LIMITED
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OUR REGULAR PRODUCTS:
THREAD GAUGES
SNAP GAUGES
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WE ARE GENERAL AND SPECIAL TOOL MAKERS

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MACHINES, EQUIPMENT APPLIANCES and TOOLS
for
SPECIAL PURPOSES
DESIGNED AND BUILT

We will make what YOU want as you want it.
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CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont
Welland Motor & Machine Co., Welland, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams-Machy Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co, Harvey, Ill.

CONVEYORS, BELT AND CHAIN
Can. Link Belt Co., Toronto, Ont.
Jones & Glasco, Montreal.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.
Bertram & Sons Co., John, Dundas, Ont.
Gardner Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.

COPPER, BUS BAR, SHEET, PLATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto, Ont.

COUNTERSHAFTS
Almond Mfg Co., T. R., Ashburnham, Mass
Baird Machine Co., Bridgeport, Conn.
Ford Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill
Wilson & Co., J. C., Belleville, Ont

CRANES, LOCOMOTIVE
Can. Link Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Quebec.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Anderson & Co. of Canada, Geo., Montreal, Que
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Quebec.
Manitoba Bridge & Iron Wks., Ltd., Winnipeg, Can.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York
Northern Crane Works, Walkerville

CRANK SHAFTS
Canada Foundry & Forgings, Ltd., Welland, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville
Rice, Lewis & Son, Toronto, Ont
Whiting Foundry Equipment Co., Harvey, Ill.
Wilson & Co., Belleville, Ont.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass

CRUCIBLES
Hyde Engineering Co., Montreal, Que.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh, Pa

CUPOLA BLOCKS
Hyde Engineering Co., Montreal, Que.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES AND BLOWERS
Sheldons, Ltd., Galt, Ont.

CURB PUMPS FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland, Ont.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.

CUTTERS, BOLT
Greenfield Tap & Die Corp., Greenfield, Mass.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING
Becker Milling Machine Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co. New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Rice, Lewis & Son, Toronto Ont.
Tabor Mfg. Co. Philadelphia, Pa
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy. & Supply Co., The Geo. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy Co., South Sudbury, Mass
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mchy & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co. Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.
Elm Cutting Oil Co., Toronto.
Ontario Lubricating Co., Hamilton, Ont.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., S. F., Inc., Fort Wayne, Ind

CUTTING AND WELDING PLANTS
Canadian Welding Works, Montreal, Que
Prest-O-Lite Co., Inc., Toronto, Ont.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor, Ont.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co, Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DEEP DRAWING DIE STEEL
J. F. A. Comstedt, New York City, N.Y.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co. Montreal.
Marsh Engineering Works, Belleville, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co. of Can., Geo., Montreal, Que.
Ford-Smith Machine Co., Hamilton, Ont.
Joyce Koebel Co., Inc., New York City
Wheel Trueing Tool Co., Windsor, Ont.
Wheel Trueing Tool Co., Detroit.

DIAMONDS, CARBON & BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield Mass.
Wells Bros. of Can., Galt, Ont

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pittsburgh Steel Stamp Co., Pittsburgh, Pa

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
The Geo. F. Foss Mchy & Supply Co., Montreal
Gardner, Robt., & Son, Montreal
A. B. Jardine & Co., Hespeler, Ont
Landis Machine Co., Waynesboro, Pa
Modern Tool Co., Erie, Pa
Morse Twist Drill & Mch Co., New Bedford, Mass
National Acme Co., Cleveland, Ohio
Pratt & Whitney Co., Dundas, Ont
Rice Lewis & Son, Toronto, Ont
Rickert-Shafer Co., Erie, Pa.
Standard Machy & Supplies Ltd., Montreal
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.

DIES, NOSING
Marsh Engineering Works, Belleville, Ont

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston, Mass
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES, BOLT, PIPE
Greenfield Tap & Die Corp., Greenfield Mass.
Wells Bros. of Can., Galt, Ont

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit, Mich
Wells Brothers Co. of Canada, Galt, Ont.

DIE BLOCKS, HEAVY FORGED
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE FORGINGS
Hammond Steel Co., Inc., Syracuse, N.Y.

DIE STEEL, HOT AND COLD WORK
Armstrong, Whitworth of Canada, Montreal, Que.
Firth & Sons, Thos., Montreal, Que.

DIES FOR SCREW PLATES
Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Normac Machine Co., St. Catharines, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor, Ont.
Worth Engineering Co., Toronto, Ont.

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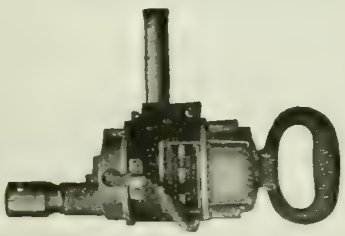

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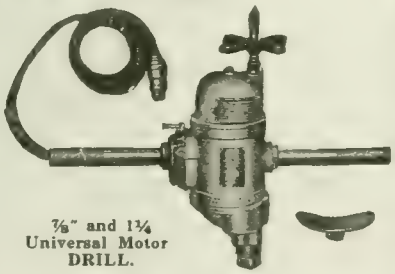

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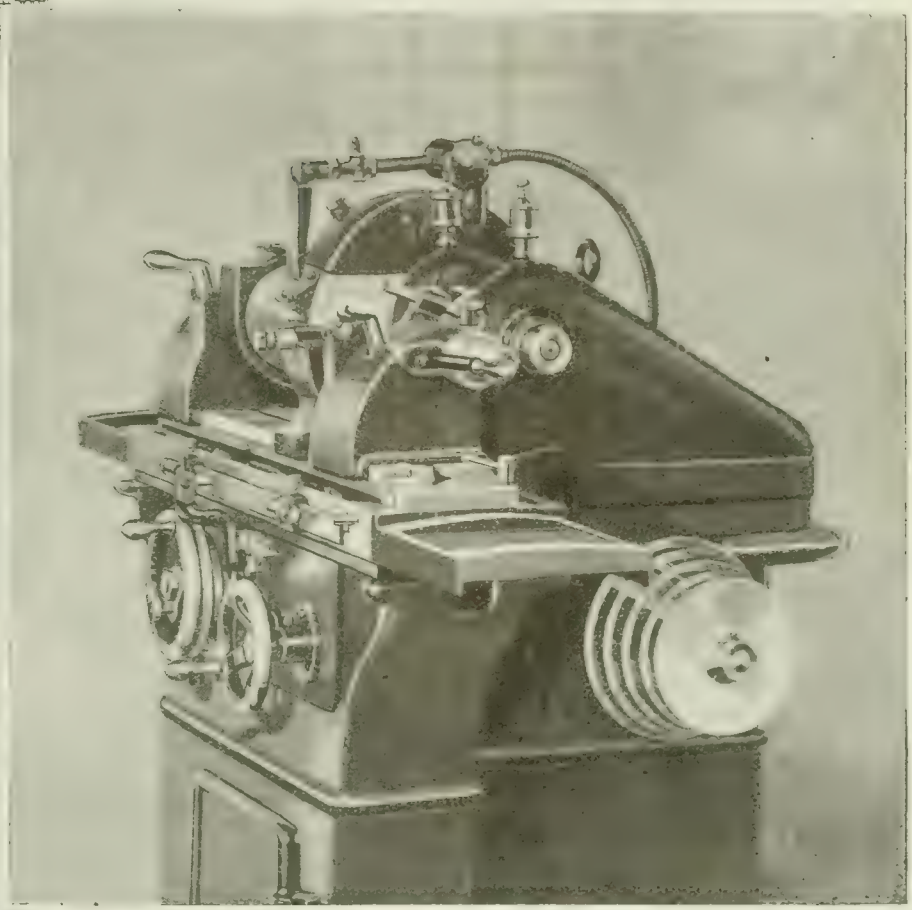

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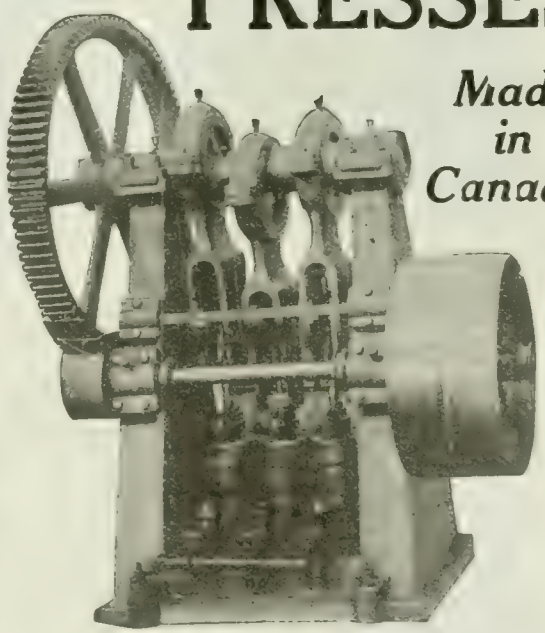

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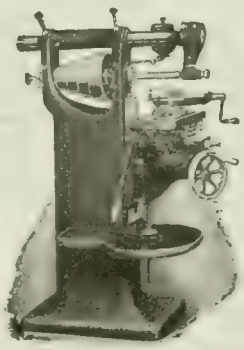

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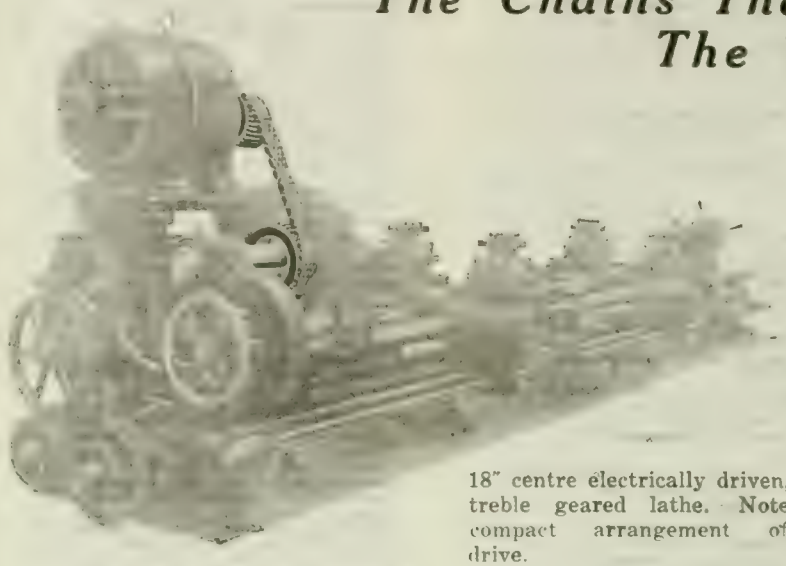

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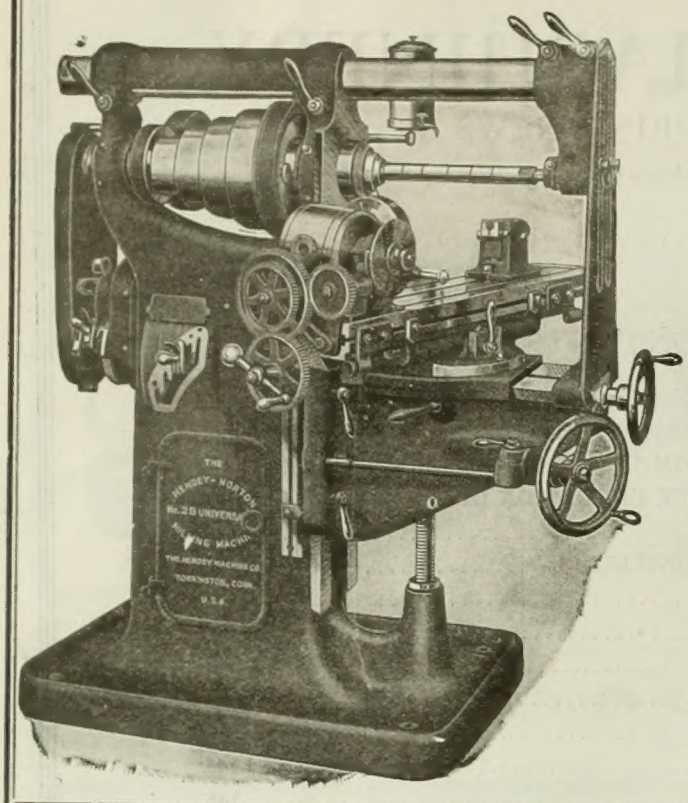

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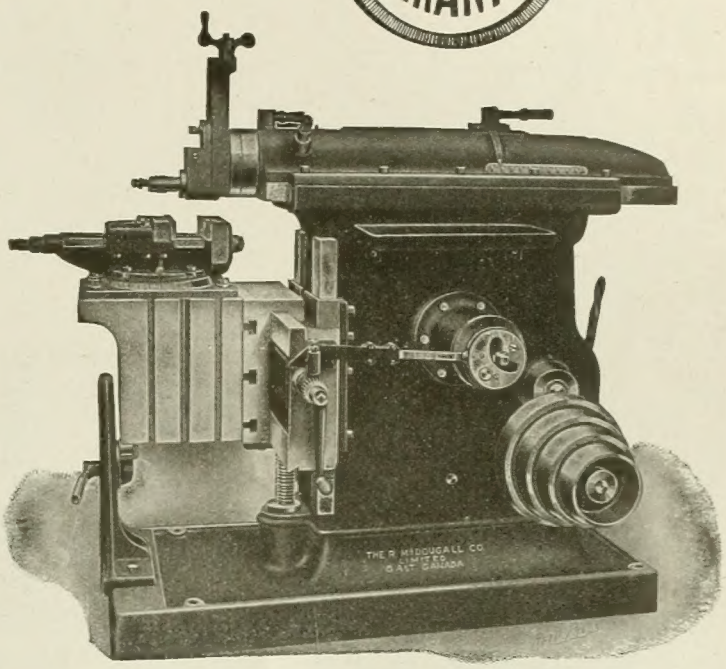

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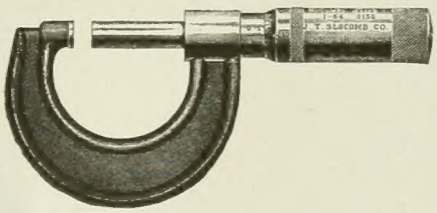

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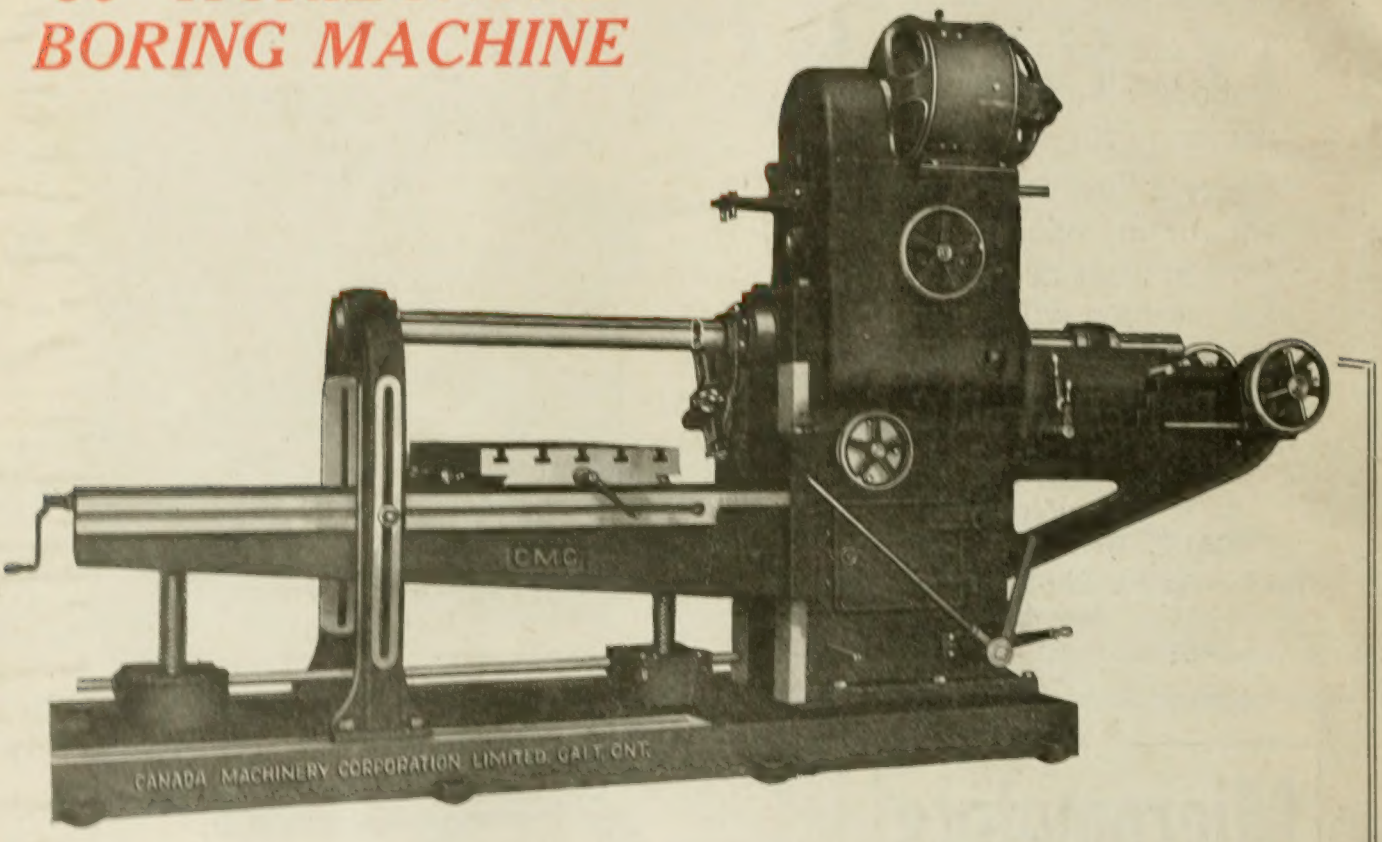
305 St. James St. Montreal, Que.

C.M.C.

60" HORIZONTAL BORING MACHINE



This boring machine is of new design in which much attention has been given to compactness and ease of manipulation. All gears are enclosed and safety devices are provided to prevent accidental meshing of conflicting gear ratios.

The machine may be driven either by variable speed motor as shown in the illustration or by means of a separate countershaft, cones and back gearing.

Special descriptive bulletin gladly furnished upon request. For sale direct or by all leading machinery dealers.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

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